Policy Advisory Committee Meeting

California Water Plan Update 2018

DRAFT Chapters 1 – 5

– For Discussion Only –

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Chapter 1. Envisioning Water Resources Sustainability

For several generations, the word "California" has represented much more than a place. To this day, it invokes images of exceptionally satisfying ways of life and well-being coupled with enduring, world-class natural resources. It has offered seemingly endless opportunity for enriching recreation, diverse cultural practices, and economic prosperity. Its vast and varied landscapes have allowed for ecosystems to thrive.

Yet today, the people of California are living a tale of two extremes — regular cycles of droughts and floods— exacerbated by climate change. If the current trends continue long enough, California will no longer provide the benefits, opportunities, or resources for which it has long been known around the world. Although all Californians must contribute to ensuring a sustainable future, water managers have significant responsibility for ensuring that beneficial conditions and resources endure, the state is positioned to adapt to extreme events, and previous negative impacts are reconciled with current societal demands.

Since *California Water Plan Update 2013* (Update 2013), these reoccurring extreme weather events, though typical of our Mediterranean climate, have been experienced to varying degrees across the state. Moreover, they appear to be intensifying with climate change. To prepare for longer and deeper droughts and more severe flooding, Californians must engage in strategic and integrated water management planning. Water users, planners, managers, and policy-makers must collectively plan and manage California's water systems in a proactive way, to ensure that those systems are resilient to changing conditions and able to adapt nimbly and dynamically to stressors. The focus must shift away from reacting to extreme events as emergencies to preparing for them as day-to-day realities. Only proactive, strategic planning and adaptation, at local, regional, and State levels, can ensure a sustainable future for California.

California Water Plan Update 2018 (Update 2018) establishes the State's commitment to ensuring a sustainable future for California and describes how the State can support and empower local and regional entities to make the vision of sustainable water resources management a statewide reality.

Setting the Context for Update 2018

Update 2018 is the twelfth in a series of California Water Plans prepared since 1957. Update 2018 builds on Update 2013. Since Update 2013, California has suffered through an unprecedented multi-year drought that threatened the water supplies of communities and residents; devastated agricultural production in many areas; worsened groundwater overdraft and subsidence that is affecting the integrity and security of essential water, transportation, and other utility infrastructure; and harmed fish, animals, and their ecosystems. The drought was followed by the wettest year on record, emergency incidents at Oroville Dam, and flood events around the state. These events have called attention to the vulnerability of the state's aging flood and water management infrastructure.

Californians seized the opportunities created by these events to make long-term changes in water resources management. These important initiatives, along with others, are steering California toward managing its complex water systems for sustainability.

- On February 24, 2017, Governor Brown announced a four-point plan to bolster dam safety and flood protection: 1) invest $437 million in near-term flood protection and emergency response actions, totaling $50 billion over the next few decades; 2) require emergency action plans and flood inundation maps for all dams; 3) enhance California's existing dam safety inspection program; and 4) seek prompt regulatory action and increased funding from the federal government to improve dam safety.
- The *California Water Action Plan,* released by Governor Jerry Brown's administration in January 2014 and updated in January 2016, describes a set of essential actions intended to "lay the foundation for sustainable water management in the coming decades" (California Natural Resources Agency et al. 2016).
- The Sustainable Groundwater Management Act of 2014 set in motion a foundational transformation to the governance, planning, and management of groundwater basins in California. This significant new policy takes a long-term, outcome-driven approach to groundwater management. Inherent in this approach is the understanding that it will take years to contribute toward sustainable groundwater basins, and proactive management will need to continue in perpetuity to keep delivering the intended outcomes.
- Proposition 1 — the Water Quality, Supply, and Infrastructure Improvement Act of 2014 — was passed by the voters in 2014 and made available $7.5 billion to support a safe drinking water and water-supply reliability program for California. The bond provides public funding for public benefits associated with new surface water and groundwater storage projects; regional water-supply reliability; sustainable groundwater management and cleanup; water recycling; flood management; water conservation; and safe drinking water, including specific allocation of funds for disadvantaged communities. The overwhelming success of Proposition 1 at the polls indicated that Californians are willing to take necessary steps to fund water management system improvements.

Despite these important initiatives and significant physical improvements in water resource systems and in system management over the past few decades, California still faces unacceptable risks from flooding, unreliable or unsafe water supplies, undesirable results caused by groundwater depletion, and habitat and species declines. Our interconnected system for using and managing water is extremely complex and subject to continually changing natural and human-made conditions. Moreover, water resources provide critical support for the success of other dynamic systems: our ecosystems, social systems, and economic and market systems. Many of California's ecosystems and much of our water supply and flood protection infrastructure are no longer functioning as intended or have exceeded their design life. California still depends on many outdated World War II-era investments and innovations. If this practice continues, some degree of foreclosure on our future prosperity will occur from the consequences of societal catastrophes, such as droughts, floods, and species/habitat extinctions.

Because our water resource system is complex, making further improvements is complicated by several issues and challenges.

- In many parts of the state, people and property are still at risk for catastrophic flooding. One in five Californians live in a floodplain, and more than $580 billion in assets (i.e., crops, property, and public infrastructure) are at risk.

- Ecosystems continue to decline, and several species are on the brink of extinction.
- Groundwater overdraft, lack of access to clean water in some communities, and unreliable water supplies persist in some regions.
- Water management efforts typically focus on short-term actions without considering desired outcomes over the long term.
- Climate change will have a profound impact on California's water resources, such as changes in snowpack, sea level, and river flows. The potential change in weather patterns will exacerbate flood risks and add additional challenges for water supply reliability.
- The State of California has no standing process to prioritize and fund long-term, sustainable investment in water management and ecosystem protection.

These important challenges cannot be addressed by tweaking the current system. Policy conversations must move beyond the notion that there are a handful of "problems" that can be "solved." Water resources management is an ongoing activity; water must be managed in perpetuity. Sustainably managing water resources statewide is the most effective way to support the values society holds in common. This will require more rigorous tracking of effectiveness, learning from what is working and what is not, and adapting practices and behaviors more quickly.

Managing Water Resources for Sustainability

Sustainability is the ultimate goal of water resources management in California. Sustainability is not an end point but an ongoing, resilient, and dynamic balance between four societal values — public health and safety, a healthy economy, ecosystem vitality, and opportunities for enriching experiences. Dynamic balancing is necessary as the relative importance of societal values change over time, often expressed through political processes.

The California Water Action Plan called attention to the need to respond to changing conditions and established the three goals of "more reliable water supplies, the restoration of important species and habitat, and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades" (California Natural Resources Agency et al. 2016). Further, all of the changes mandated in the Sustainable Groundwater Management Act are designed to support the sustainable use of water.

The following subsections describe how water managers can support sustainability and contribute to the societal values.

Public Health and Safety

Water resources management contributions to improve public health and safety include:

- An adequate water supply for domestic needs, sanitation, and fire suppression.
- Reduced number of people exposed to waterborne health threats, such as contaminants or infectious agents.
- Reduced loss of life, injuries, and health risks caused from extreme hydrologic conditions, catastrophic events and/or system failures (including infrastructure).

Healthy Economy

Water resources management contributions to a healthy economy include:

- Reliable water supplies of suitable quality for a variety of productive uses, and productive water uses are based on a reliable supply.
- Considerations of economic risks and rewards on floodplains, rivers, and coastal areas.
- More benefits from economic activities, including from reduced costs to provide a given level of service (including transaction costs).
- Reduced likelihood or occurrence of significant social disruption following a disaster.

Ecosystem Vitality

Water resources management contributions to thriving ecosystems include:

- Preserved or enhanced biodiversity throughout the state.
- Sustained high quality natural resources and habitats in harmony with predicted economic activity and human population increases.

Enriching Experiences

Water resources management contributions to enriching experiences for Californians include:

- Preserved or enhanced culturally or historically significant sites and communities, including continued and enhanced access to water and land used for sacred ceremonies or practices.
- Preserved and increased natural areas with aesthetic or intrinsic value.
- Continued and enhanced access to resources that support education and learning.
- Continued or enhanced recreational opportunities in waterways, reservoirs, and natural and open spaces.

Guiding Principles for Managing Water Resources for Sustainability

The guiding principles listed below describe how water managers can support the societal values through how they make decisions and do business. These principles support effective planning by fostering trust through integrity, accuracy, transparency, and proper use of information in decision-making.

- Manage California's water resources and management systems through an ongoing, resilient, and dynamic balance of four societal values.
- Apply California's longstanding constitutional principles of reasonable use and public trust, as the foundation for public policy-making, planning, and management decisions on California water resources.
- Promote environmental justice — the fair treatment of people of all races, cultures, and incomes.
- Help establish shared intent for sustainability with long-view perspective for water resources management.
- Strengthen partnerships and help enhance governance to improve and align at all levels of government for effective integrated water resources management.

- Promote regional planning and resource management on a watershed scale to increase regional self-reliance and effectiveness, and acknowledge each region's unique perspectives, needs, and priorities.
- Acknowledge future variability, risk and uncertainties, and cultivate learning and adaptation in the decision-making process.
- Use science, best data, and local and traditional ecological knowledge in a transparent and documented process.
- Invest with a long-term view with substantial and predictable public funding to increase system flexibility and resiliency.

Managing for sustainability means that water managers must invest in actions that meet today's needs and societal values. They must accomplish this without compromising the long-term capacity of the water system to provide for future generations and the natural environment. Sustainable water use and sustainable management of California's water systems require significant focus on actions and outcomes that support sustainability. The focus must shift toward defining shared outcomes with clear intent and monitoring how, and to what extent, our actions contribute to sustainability. Moving toward sustainable water resources management requires a long-lasting commitment to sustainability; collaboration among State, federal, tribal, and local agencies; and significant financial resources.

Long-term View: Aligning at the Watershed Scale to Support Water Resources Sustainability

If water managers are managing water resources for sustainability, what does the future look like?

- *All Californians are protected from health and safety threats and emergencies*.
- *California has a healthy economy and all Californians have opportunities for economic prosperity*.
- *Ecosystems in the state are thriving*.
- *All Californians have opportunities for enriching experiences*.

To make systems for sustainably managing water resources effective throughout the state, most of the work must happen at local and regional scales. Update 2018's primary concern is how State government can support and empower management planning and practices at the regional scale. Regional and local water agencies and organizations have the most detailed knowledge of their own watersheds, ecosystems, and groundwater basins, even as those regional entities look to the State to fulfill its leadership role.

Update 2018 and future Water Plan updates will enhance the efficacy and value of existing and future State water policy and investments by:

- Offering a consistent and recurring outlook on California's water sustainability.
- Assessing the effectiveness of investments and actions taken, including State water initiatives.
- Recommending State policy and investments.
- Identifying State funding strategies with more stable revenue sources.

Given the complexity of California's natural and constructed water resources, as well as the thousands of agencies responsible for resource management, State, regional, and local governance must align planning and implementation at the most workable and effective geographic scale. The determination of the appropriate geographic scale should consider the interdependent physical (especially hydrologic), biological, economic, and social processes and functions within each basin. Interactions among regions must also be considered to encourage and increase mutual benefit.

Designing management efforts in more integrated ways, specifically at the watershed scale, will improve planning and implementation. The more effective regional and State governance becomes, the easier it will be to implement integrated watershed strategies and plans. Working at a watershed scale will build on and improve existing IRWM and SGMA institutional arrangements and governance, as well as planning and other activities.

The State's role is to ensure that regional entities have the incentives, knowledge, tools, authority, and guidance to develop, implement, and enforce water resources management practices for sustainability. State agencies should assist regional entities with building capacity to strengthen governance; establish collaborative management of resources; and provide regional government agencies the necessary data, tools, models, and processes to conduct regional water sustainability assessments. State agencies should provide technical and facilitation assistance to regions developing watershed plans for sustainably managing water resources and identify the types of investments and actions needed to realize those desired changes.

Taking a long-term view, characterized by synthesis and integration, will result in a more holistic, integrated, and actionable set of plans prepared at the watershed scale (i.e., watershed sustainability plans). Over time, this broader approach to planning is expected to support statewide planning and annual preparation of recommended State investment priorities.

Watershed planning efforts must become a foundation for prioritizing investments and actions, and leveraging resources to manage water and related resources more effectively and sustainably. The outcomes of investments in all basins need to be monitored, tracked, and reported more consistently over time. Doing so will determine how effectively those outcomes are supporting the four societal values.

Sufficient and stable funding will be required in perpetuity to continuously invest in the rehabilitation, modernization, and operations and maintenance of water resources management systems. This will ensure that existing and future infrastructure (green and grey) provides the necessary flexibility to realize intended benefits and resiliency to inter-annual hydrologic variability and other uncertainties. Water and other related resources infrastructure (green and grey) must be maintained, rehabilitated, reconstructed, or modernized, as necessary, to perform effectively over many years.

Regulatory standards based on watershed conditions and goals could be developed to support regional management. Consistent with Action 8 of the *California Water Action Plan,* a dialogue among federal, State, and local agencies, whose responsibilities span all aspects of water management, is needed to reconcile differing regulatory frameworks with the goal of more cost-effective and successful delivery of intended benefits and services. The dialogue would identify where regulatory discretion or alternative compliance pathways could be enabled and exercised to more effectively accomplish intended

outcomes. All this must be accomplished while protecting the societal values the public holds in common and relies upon.

Clearly, this transformative approach will take decades to implement. Practical, deliberate planning and implementation at the watershed scale is important so that observable outcomes, actions, and tradeoffs can be discussed and evaluated holistically. The lessons learned from IRWM, SGMA implementation, and other regional partnerships must be applied to effectively align planning and implementation at a watershed scale.

Evolution and Direction of the Water Plan

Update 2013 was encyclopedic in its coverage of water management in California. At more than 3,500 pages, Update 2013 covered a variety of information, from detailed descriptions of current and potential regional and statewide water conditions to a detailed "Roadmap For Action" that identified potential actions to support 17 objectives. Update 2013 also included detailed reports on each of California's hydrologic regions and overlay areas. Those "state of the region" reports focused on watersheds, groundwater aquifers, ecosystems, floods, climate, demographics, land use, water supplies and uses, and governance. Water managers were also provided an integrated water management toolbox in the form of 30-plus resource management strategies. Discussed were strategies to reduce water demand, increase water supply, improve water quality, practice resource stewardship, improve flood management, and recognize people's relationship to water. The comprehensive, detailed nature of Update 2013 informs this update's more concise call for collaborative, integrated action.

Specifically, Update 2018 frames the State of California's need for:

- More integrated and aligned water planning processes to prioritize and fund long-term, sustainable investment in water resources management.
- Consistent and practical ways to measure progress and return on public investments over the long term.
- Effective water resources management as an ongoing activity that is continuously evaluated using a cyclic process of:
    - Setting shared intent/outcomes.
    - Assessing past gains and deficiencies.
    - Taking action.
    - Measuring effectiveness.
    - Adapting as needed.
    - Repeating the cycle.

Update 2018's approach to managing California's water resources more sustainably will require increased rigor in tracking effectiveness, learning from what is working and not working, and nimbly adapting based on lessons learned.

Successive Water Plan updates will build on Update 2018 by periodically reevaluating the intended outcomes, consistently tracking and reporting on the effectiveness of public and private investments, and revising and refining State policies and investment priorities. This will include conducting annual assessments of the water management system and actions taken to support managing water resources

for sustainability. It will provide the water community the opportunity to adjust course if the intended outcomes are not being achieved.

Whether the word “California” continues to signify the promise of satisfying ways of life, well-being, and enduring natural resources will depend on the choices all Californians make. The recommended actions, funding mechanisms, and implementation schedule presented in Update 2018 support the creation of a sustainable future.

Chapter 2. Sustainability Outlook

Enduring water challenges and unforeseen catastrophic events threaten the future of California's diverse ways of life, its economic health, and its rich biodiversity. One long-standing foundational challenge to water resource resilience and reliability in California is the lack of a consistent and practical method for assessing current and future sustainability. Productive conversations and planning for sustainability require a mutual understanding of resource limitations, management deficiencies, and shared intent in identifying policy priorities.

California Water Plan Update 2018 (Update 2018) presents a major improvement in the way water policy and management priorities are developed and coordinated at local, regional, and State levels. The Sustainability Outlook, described in this chapter, provides that well-organized and consistent approach.

Once fully utilized at a regional scale, the Sustainability Outlook will increase the effectiveness of State water policies and investments. This chapter explores opportunities that can be leveraged to transform our challenges into assets. This chapter also provides the urgency and backdrop for "Recommended Actions to Support Long-term Sustainability" (Chapter 3), as well as the importance of follow-through by those who would implement those actions, as identified in the "Funding and Implementation Plan" (Chapter 5).

Water is our most basic resource in California. Managing water for sustainability is the only way to dynamically balance the four societal values for all Californians. It is as simple as being mindful of not wasting water, and as complex as predicting and planning for the next drought or flood. Nonetheless, every Californian is responsible for doing his or her part, every day. But how can the people of the State know where they stand and whether their actions are moving the State in the right direction?

Update 2018 proposes that managing for sustainability needs to be rooted in the things Californians value most — public safety, the natural environment, the economy, and the experiences that enrich their lives. Through the lens of these four societal values, Update 2018 identifies desired water management outcomes and the indicators that can be used to gauge current status and progress. But sustainability is not something achieved once and forever; rather, it represents a balance of conditions that must be strived for on a continual basis. For Update 2018, this means looking back at recommended actions in *California Water Plan Update 2013* (Update 2013) to assess what has been accomplished and make the adjustments necessary to move toward a sustainable future.

Water Management in California Today

With its wide variety of climates, landforms, people, and institutions, California is often described as a land of extreme diversity and variability. This diversity has played a significant role in the State's history and development. This is particularly true of California's water resources systems as well as its social, institutional, and planning factors. Effective integrated water management (IWM) planning and implementation will reduce variability and uncertainty pertaining to water supply, ecosystems, and public safety. This section provides a description of the geophysical, social variability, and diversity that affect water resource management and IWM planning.

California Water Resources Conditions and Infrastructure

Precipitation is the primary source of water supply in California, and it varies from place to place, season to season, and year to year. With a Mediterranean climate, most of the snowfall and rainfall occurs in the winter and spring along the west-facing slopes of the mountains in the northern and eastern areas, while most of the population and farmland are along the coast in the drier southern half of the State and along the coast. California's ecosystem, agricultural, and urban water users have variable demands for the quantity, timing, and place of use. In any year, we often experience one of two extremes – the State's water systems may not have enough water to meet all water demands during droughts or when an excess of water causes floods – which complicates government policy and regulation significantly by necessitating place-specific information, trade-offs analysis, and decision making.

The last century was marked by the development of facilities, institutions, and regulations to manage the disparities between precipitation in the winter and lack of precipitation in the summer, as well as the geographic disparity between water availability and water demands. In the mid-20th century, State, federal, and local agencies vastly expanded the State's system of reservoirs, canals, pumps, and pipelines to capture and move water when it was available, store it for when it was not, and deliver it to agricultural and urban users in when and where they wanted it. Significant investments were also made in the State's flood protection system, including levees and bypasses. These changes to the physical infrastructure have resulted in unintended consequences to the natural environment. Today California's water systems are increasingly called on to serve multiple purposes and to provide an array of benefits to the State, its people, and its ecosystems.

Water Supply Reliability. The State relies on its watersheds and groundwater basins to provide clean and sufficient water supplies. Healthy surface water and groundwater are essential to public health and safety, California's ecosystems and economic future, and enriching experiences. Surface and groundwater resources have been largely managed as separate resources when they are, in fact, a highly interdependent system of watersheds and groundwater basins. Disconnection of these resources has had devastating impacts on California's cold water fishery, riparian habitat communities, and ecosystem services.

The statewide water balance (Figure 2X-1) demonstrates the State's variability for water use and water supply. ***Water use*** shows how applied water was used by urban and agricultural sectors and dedicated to the environment; ***water supply*** shows where the water came from each year to meet those uses.

Flooding. California is at risk for catastrophic flooding that has wide-ranging impacts because of the size of its economy and the number of people residing in the State. Flooding occurs in all regions of the State in different forms and at different times. Every county in California was declared a Federal disaster area at least once for a flooding event in the last 20 years. On the other hand, flooding in California can produce beneficial effects and support natural functions (for example, replenishing ecosystems with sediment and nutrients, and helping to recharge groundwater aquifers). Flooding also can provide beneficial habitat conditions; however, as people and structures have moved into floodplains, the need for flood protection has increased.

Figure 2-X1. California Water Balance by Water Year, 2005-2015 <to be added>

Environment and Ecosystems. In addition to managing water resources for domestic, industrial, and agricultural uses, the State's water must also be managed for the needs of the environment and its ecosystems. Although a considerable amount of water is dedicated to the maintenance and restoration of aquatic and riparian ecosystems, environmental needs are not always met. Studies of the streamflow requirements of aquatic life, mainly represented by salmon, reveal that flows in many California rivers and streams sometime fall below minimum desirable levels (Update 2013, Volume 1 Chapter 3).

Fish species in California's waterways have generally declined over time in response to changing habitat and flows, and from both planned and accidental introductions of nonnative species. As an example, of the more than 50 species of fish in the Delta today, more than half, including the most successful, are nonnative.[1]

Water Quality. An ever increasing population across the State has resulted in increased runoff of agricultural, industrial and urban pollutants to both surface and ground water. In addition, increased agricultural and urban wastewater discharges, changes in commercial practices and recreational activities, changes in temperature and precipitation patterns caused by climate change, changes in the timing of river flows, as well as other causes have altered water quality, riparian habitat, instream flows, and have negatively impacted many of California's ecosystems.

Water and People. Federal agencies own approximately 47 percent of California's 100 million-plus acres. The U.S. Department of Agriculture Forest Service (USDA Forest Service) is the largest public forest land manager in the State. Federal and State owned lands, combined with other areas such as the Delta and the coastal lands, offer numerous opportunities for water relate recreational activities, such as camping, boating, fishing, hiking, birding, and hunting. In addition, all California tribes and tribal communities, whether federally recognized or not, have distinct cultural, spiritual, environmental, economic, and public health interests related to water.

Historical Investment in Water Management

Historical investment in water management has not kept pace with water management needs. The average total historical investment from local, State, and Federal agencies is approximately $30 billion per year, which will not support the level of investment needed by local, State, and Federal agencies to sufficiently meet future capital and ongoing need. Ongoing expenditures have risen steadily since 2005 driven by an increase in administrative costs at the local agency level. Capital expenditures have remained fairly consistent, averaging approximately $5 million per year.

Figures 2-X2 through 2-X4 show the total, capital, and ongoing historical expenditures for all local, State, and Federal agencies from 2005 through 2015.

[1] Delta Stewardship Council. 2013. *The Delta Plan*.

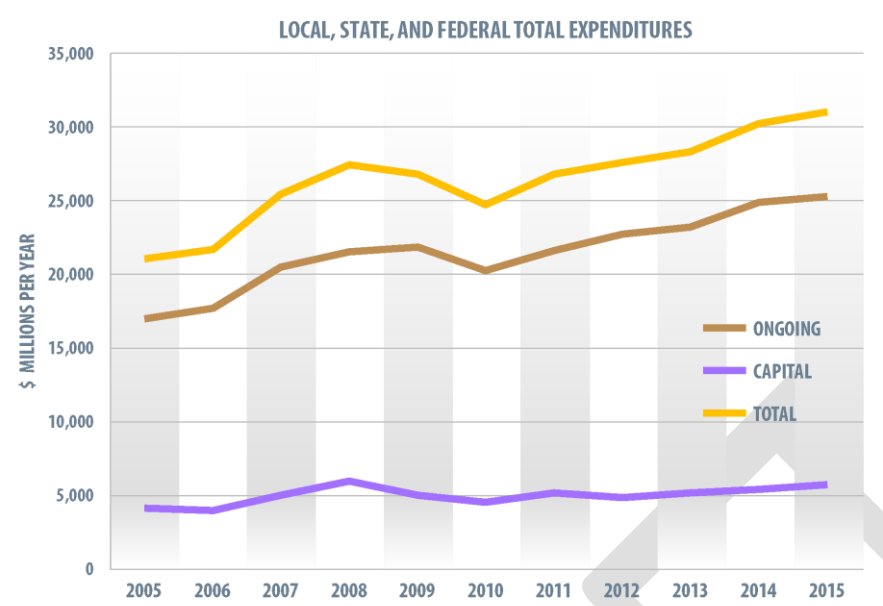


Figure 2-X2. Total Local, State, and Federal Historical Expenditures

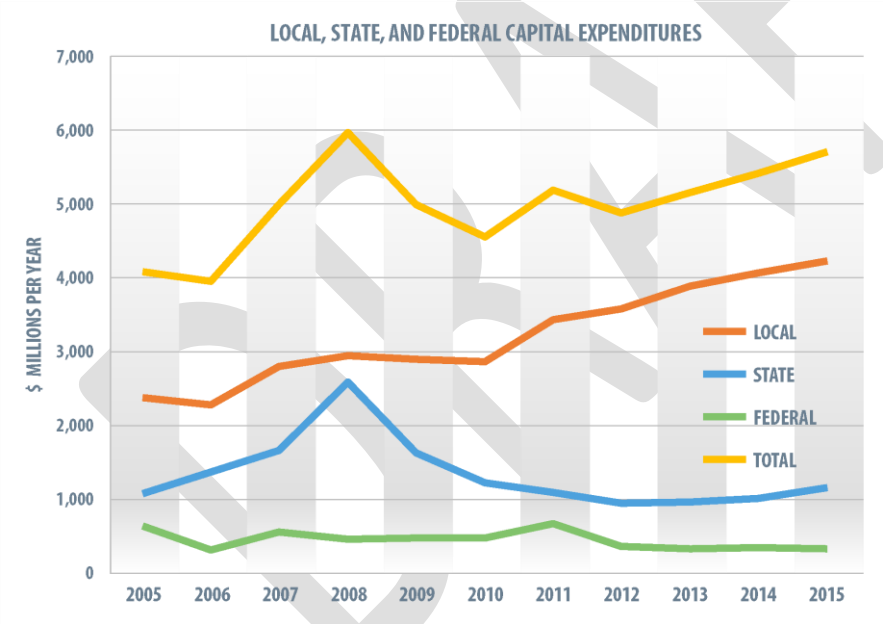


Figure 2-X3. Total Local, State, and Federal Historical Capital Expenditures

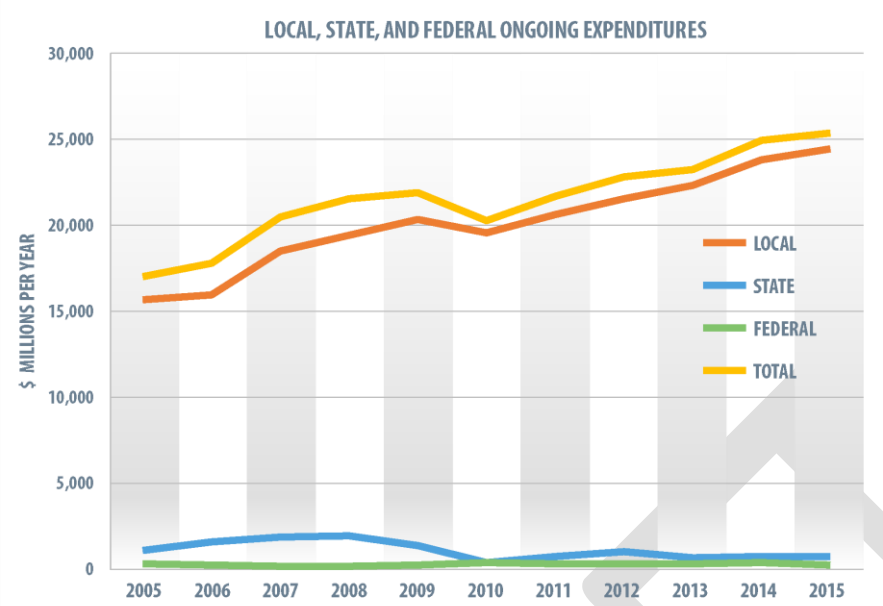


Figure 2-X4. Total Local, State, and Federal Historical Ongoing Expenditures

Local agencies fund a majority of water management in the State with capital expenditures increasing over time to keep pace with the issuance of State grant programs. State expenditures from the general fund have decreased over time as bond issuance has increased. This shift has led to a reliance on bond funding for water management, resulting in unstable funding that is dependent upon public perceptions and priorities. Federal funding for water management in California has remained consistent and has not risen to meet current capital and ongoing needs.

California State Water Management Plans and Initiatives

The State's arid climate and history of both drought and flood have prompted a variety of programs, actions, and initiatives aimed at achieving greater water sustainability statewide. At the State level, a variety of planning efforts, funding programs, regulatory reforms, and policy directives are helping to address key water resources management concerns. Descriptions of these plans and initiatives are included in *Appendix <add #>*.

Challenges to Sustainability

California has realized many successes in water resources management over the past several decades, driven by State-level policy initiatives and programs, and local and regional actions. However, there is also strong evidence of decline of the State's water resources, and increasing conflicts in meeting both ecological and human needs. Climate change, demographic changes, and other variables have underscored the need to improve the effectiveness of water resources management so these valuable resources are sustainable over time. Just as important as understanding the challenges California faces today, are recognizing trends and the reasons for change, and increasing resilience to recover from unforeseen, disruptive events that will influence water resources management in the years to come.

To illustrate the extreme dynamics facing water managers today and in the future, California experienced severe drought during the past 5 years that was accompanied by accelerated groundwater depletion, continued habitat and species declines, and economic hardships to many communities overly

reliant on imported water supplies. This dry period was then followed by the wettest year on record, with extreme hydrology causing catastrophic failure to major infrastructure and threatening the lives and properties of citizens that live behind a system of levies throughout the State.

California's interconnected systems for using and managing water are extremely complex and subject to continually changing natural and human-made conditions. Despite important statewide initiatives and significant physical improvements in water resource systems and in system management over the past few decades, California still faces unacceptable risks from both foreseeable and unanticipated threats to sustainable water resources management. However, because our water resource system is complex, the dilemma of making further improvements to support long-term sustainable management is complicated by several critical gaps and urgent needs (challenges). As summarized below, these challenges can be grouped into two categories: (1) foundational, and (2) specific.

Foundational Challenges. These are fundamental and overarching challenges that regions and communities cannot efficiently or cost-effectively address on their own, but on which the State can take action to provide broad public benefit.

- **Initiatives and Governance:** The ability to sustainably manage water resources at a watershed scale is often impaired by the lack of coordination and alignment of water and land management efforts of local, regional, State, and Federal agencies and tribes, as well as inconsistency with the societal values.

- **Regulatory Framework:** The current regulatory framework does not easily allow for the reconciliation of both environmental needs and human activities, does not take a systems-oriented approach, and is not directly tied to and informed by ongoing planning and implementation efforts.

- **Capacity for Data-Driven Decision-Making:** Water managers often do not have access to adequate technical information, tools, and facilitation services to support regional efforts toward sustainable, integrated water management. Although this is a challenge statewide, the consequences are very evident in under-represented and economically disadvantaged communities.

- **Infrastructure:** Water- and flood-related infrastructure is often not operated, maintained, rehabilitated, and modernized to allow it to continue providing the intended outcomes in light of facility age, the effects of climate change, current management practices, and new data.

- **Funding:** Local, regional, State, and federal funding necessary for water resources management activities over time (both planning and implementation) is neither sufficient nor sustainable.

Specific Challenges. There are also specific challenges to long-term sustainability that water managers face every day and over which they have varying degrees of control.

- **Some communities lack access to clean, safe, and affordable water supplies:** During the recent drought, many communities were unable to provide stable, safe water supplies to their residents for household uses. Nearly 700 communities have water systems that, prior to any

treatment, rely on contaminated groundwater.[2] Over 200 of the State's public water systems are not in compliance with safe drinking water standards,[3] and many more lack access to affordable and/or reliable water supplies. In many cases this is caused by degraded surface water and groundwater quality.

California's population is expected to increase from 39.4 million in 2016 to 51.1 million by 2060.[4] Other communities are at risk of having their residential supplies disrupted or compromised in the future. This growth is likely to put more people at risk of flooding, while also increasing demands for water. Improving conservation and water use efficiency, along with shifts in agriculture to permanent crops, will make it more difficult to reduce consumption during droughts and periods of low supply (i.e., demand hardening).

- **Groundwater levels are declining at startling rates:** Driven by recent and extended drought, groundwater levels in many parts of the State are declining at alarming rates. This rapid decline has led to ground surface subsidence in some areas, causing costly damage to water supply, transportation, and flood infrastructure. Even in light of the recently implemented SGMA, it will take significant investments and time to reverse historical groundwater lows and achieve more sustainable management of this critical resource.

- **California will experience more extreme hydrologic events in the future:** Sustained drought conditions in the western United States in recent years, followed by extreme precipitation in California in 2017, are examples of how changes in worldwide climate are affecting precipitation and runoff in California. These wide swings in are exposing the vulnerability of California's water systems and ecosystems to severe, multi-year droughts, extreme floods, and sea level rise. Seasonal, year-to-year, and geographical variability between water sources and locations of water uses, particularly in disadvantaged communities, are also driving factors.

- **Ecological conditions in the State continue to decline:** Even with the recent focus on the health of the State's ecosystems and connection between water and ecosystem health, much habitat remains disconnected from water supplies and native species continue to decline. More than 150 individual species are listed as threatened or endangered in California and five have become extinct since 1980, with several currently on the brink of extinction.[5]

- **California's water infrastructure is aging and vulnerable to natural disasters and other hazards:** Much of California's water infrastructure is reaching the end of its design life. At the same time, costly maintenance and capital improvements have been deferred in some regions because of lack of funding or difficulty in meeting regulatory requirements. Combined with

[2] State Water Resources Control Board. 2013. *Communities that Rely on a Contaminated Groundwater Source for Drinking Water*.
[3] State Water Resources Control Board. 2016. Human right to water web site: http://waterboards.ca.gov/water_issues/programs/hr2w/index.shtml
[4] California Department of Finance. 2016. Population Projections (Baseline 2016). http://dof.ca.gov/Forecasting/Demographics/Projections/
[5] California Department of Fish and Wildlife. 2016. *State and Federally Listed Endangered and Threatened Animals of California.* July.

expected changes to the State's climate, supply disruptions due to earthquakes and flooding are likely to rise. This poses threats to public safety in terms of reduced water availability, degraded water quality, and flooding.

- **Needed water resources expenditures are underfunded:** Funding for both ongoing and new expenditures is inadequate and unpredictable due to changing public priorities, competition for available resources with other public services, reactive funding, dependence on per unit charges that reduces revenue collection during periods of required conservation, legal constraints related to assessment increases (e.g., Proposition 218), and geographical limitations on use of funds. These funding constraints have resulted in deferred maintenance of water management systems throughout the State that, in turn, often lead to additional capital needs in the future.

  Flood and ecosystem management relies on public financing, including bonds and federal funding, which are unstable and insufficient. Only 6 percent of total water resources management funding is allocated to flood management and ecosystem functions.[6] Sporadic funding that ebbs and flows with the occurrence of floods or droughts lacks the predictability and reliability required for effective long-term change. At the same time, General Obligation bond debt levels in the State are near an all-time high.

- **Some regional economies are destabilizing:** As water supplies have become less reliable, local and regional economies are more volatile, especially in agricultural and rural communities. For example, direct agricultural costs statewide from the drought total more than $1.8 billion and a loss of approximately 10,100 seasonal jobs.[7] Often these economic downturns disproportionately harm people who have the least capacity to respond to changes.

- **California's regulatory and social environment continues to change:** A changing regulatory environment, combined with misaligned, complex, and often internally inconsistent government planning and policy, poses challenges for sustainable water management and needed project development. This is further exacerbated by conflicting roles and responsibilities and often overlapping or narrow State authorities and governance structures. California's diversity of societal needs, priorities, and expectations – which evolve and may conflict with one another – poses another challenge in establishing consistent State policy and directing funding where is it needed most.

These issues place significant risks on public safety, unique ecosystems, and the vital California economy. Everyone in California is affected to some degree by these issues and careful consideration of the risks they pose is an important aspect of sustainable water management into the future. As a State and at the local level, we continue to make progress, but these concerns are urgent and more needs to be done. Several actions are recommended, and these actions are described in Chapter 3.

[6] Public Policy Institute of California. 2012. *Water and the California Economy: Technical Appendix*

[7] Howitt, Richard E., Duncan MacEwan, Josué Medellín-Azuara, Jay R. Lund, Daniel A. Sumner. 2015. *Economic Analysis of the 2015 Drought for California Agriculture*. Center for Watershed Sciences, University of California, Davis.

Specific Challenge	Recommended Action				
	Improve Alignment of Agencies' Initiatives and Governance	Improve Regulatory Framework to Reconcile Environmental Needs and Human Activities	Provide Water Managers Resources, Knowledge, Skills, and Tools Needed for Data-Driven Decision-Making	Modernize and Rehabilitate Water Resources Management Systems	Provide Sufficient and Sustainable Funding
Some communities lack access to clean, safe, and affordable water supplies	●		●	●	●
Projected population growth will exacerbate stress on available water supplies	●	●			●
Groundwater levels are declining at startling rates	●		●		●
California will experience more extreme hydrologic events in the future	●	●		●	●
Ecological conditions in the State continue to decline	●	●		●	●
California's water infrastructure is aging and vulnerable to natural disasters and other hazards	●	●	●	●	●
Needed water resources expenditures are underfunded	●				●
Some regional economies are destabilizing	●				●
California's regulatory and social environment continues to change	●		●	●	●

Evaluating Sustainable Water Management

The long-term goal for the Sustainability Outlook (Outlook) is to:

> *Establish a single comprehensive and practical method for tracking and reporting on water management and policy that provides shared agreement and consistency across State government and California's diverse regions.*

The Outlook is intended to present a snapshot of actual water and related resource outcomes (where California stands today) with respect to the four societal values. Information in the Outlook can be used by individual Californians and water management decision-makers alike to foster greater understanding of how we manage our water resources and better inform our individual and societal actions.

Development Process

The Outlook builds on existing and ongoing sustainability measurement efforts in the State and nationwide. This includes sustainability assessment pilots conducted by DWR as part of Update 2013, watershed sustainability efforts by the State Water Resources Control Board, work by the California Department of Fish and Wildlife as part of the State Wildlife Action Plan, and work by other State agencies, non-governmental organizations, and academic institutions.[8] DWR reviewed existing sustainability efforts and conducted numerous meetings and workshops with State agencies and the public to solicit input and feedback. This included identifying and sharing draft water-related outcomes tied to the four societal values; identifying potential data sources and information that could be used to assess sustainability; and considering different scales of application, from watershed to statewide.

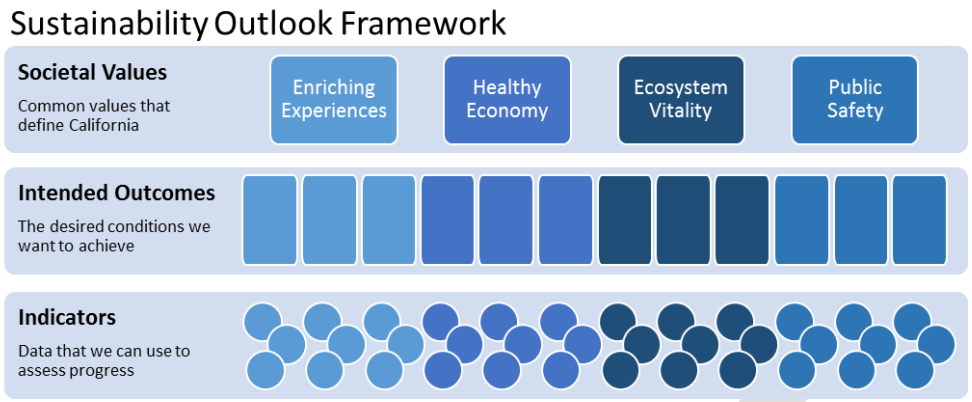
The Sustainability Outlook was initially envisioned to be a periodic exercise conducted at a statewide scale that would provide a simple "report card" for sustainable water management in California. As DWR explored different methodologies and received feedback, the vision for the outlook and its application changed. During this process, DWR identified a number of characteristics of success for the Sustainability Outlook: easily understood; flexible, to allow for different conditions and issues in areas throughout our diverse State; adaptable, for new requirements; coordinated with but not duplicative of existing efforts; able to account for data availability/accessibility and technical needs; and reasonable, implementable, and repeatable. These characteristics were foundational in developing the process and approach described herein, which now includes a basic framework for assessing sustainability, a toolbox of data and information that can be used, and a plan to apply the framework, over time, in individual watersheds throughout California.

A detailed description of DWR's process for developing the Sustainability Outlook – where it started, where it is, and where it's going – is included in *Appendix <add #>*.

Approach

The Sustainability Outlook is a framework for using data (*indicators*) to help assess our progress in achieving desired results (*intended outcomes*) linked to the four societal values.

[8] Include links to some of these efforts…



Intended outcomes, described in Chapter 1, articulate the results we would like to achieve in managing our water resources in a manner that balances the four societal values. For example, the outcomes related to the societal value of *Enriching Experiences* consider the human relationship with water – in our homes, in our communities, and in the environment. The outcomes related to *Ecosystem Vitality* consider three important facets of a healthy and sustainable ecosystem: abundance, natural processes, and beneficial uses of water in the environment. The intended outcomes are considered long-term, but they may change over time. For example, an outcome related to ecosystem vitality could continue to evolve over time as our understanding of ecological systems and the processes that drive healthy ecosystems grows.

Indicators are the data and information that is used to measure what progress has been made in achieving the intended outcomes at a point in time. California water management is complex and the interlying regions are diverse. Very large volumes of data are already being collected throughout the state by local, regional, and state entities. Not all data is relevant to decision making in all regions, and it is neither practical nor necessary to use all available data to assess water management sustainability. For these reasons, the Sustainability Outlook identifies a manageable set of indicators that generally apply statewide as a starting point for conducting regional sustainability assessments.

An example indicator for the intended outcome related to "exposure of people to waterborne health threats" is the number of public water systems not in compliance with drinking water standards. This is data currently collected the State by the State Water Resources Control Board, and it can be reliably and repeatedly collected. When measured over time, and in combination with other indicators, it can provide good insight into whether Californians are being exposed to waterborne health threats.

Societal Value	Intended Outcome	Example Indicator
Public Health and Safety	Reduced number of people exposed to waterborne health threats such as contaminants or infectious agents	Number of public water systems not in compliance with drinking water standards

Indicators may change over time as the ability to collect and interpret data changes, conditions in the State change, or the understanding of intended outcomes evolves. The Sustainability Outlook in Update 2018 identifies the basic framework and organization for conducting sustainability assessments at a

watershed scale. Conducting the assessments at a watershed scale will allow water managers to better distinguish trends, progress made, and return on investments that would be difficult to discern at a statewide scale. It will also allow water managers to introduce additional indicators that are important to specific regions of the state. Through progressive application of the Sustainability Outlook, decision makers will be able to identify needed analytical tools and data, expand upon the information available to make good decisions, and build a common and transparent understanding of individual and collective actions affect sustainable water management.

Piloting the Sustainability Outlook

Pilot programs are ongoing or are being planned, with the intent to measure progress and effectiveness of recommended actions to support long-term water resources sustainability at a regional or watershed scale. DWR has been engaged with several of these efforts and has entered into a partnership to pilot the Sustainability Outlook with two efforts at a watershed scale. These pilot efforts are:

California Forward – Russian River Watershed

The Russian River watershed was selected as pilot area due to established relationships as well as the innovative and participatory local entities with relatively few distinctive jurisdictions/agencies compared to other watersheds in the State. Work will be performed in alignment with Sonoma County Water Agency's sustainability planning when developing a framework to define sustainability outcomes and metrics, align regulatory processes to achieve sustainable outcomes, improve governance and implementation efficiency, and identify funding and finance options and capacity across the four societal values. As planned, the work will integrate with the outcome-based planning concepts advanced by the Water Plan at a regional scale. Additional work under this pilot will provide insight on policy development of watershed-based planning, regulation, and governance and funding and finance innovations.

Pacific Institute – Multi-Benefit Investment Strategies Project, Santa Ana Watershed

In collaboration with the Santa Ana Water Authority and other stakeholders in in the region, this pilot project will develop a unifying framework for evaluating multi-benefits as an outcome from water investment projects. The framework will facilitate development of consistent tools that quantify benefits imbedded in specific water projects while providing flexible application for a specific region, interest, or query. As planned, this pilot will work with both technical and practical experts in multi-benefit valuation of water projects to be sure that the unifying framework for evaluation of projects is useful and that there will be broad adoption. Overall, this project will allow for a better comparison between integrated and traditional (single purpose) projects to provide the necessary justification for cost-sharing among the beneficiaries of these projects.

Additionally, a similar effort by the Water Foundation developed a Sustainable Water Management Profile to drive improvement in the regional water supply stewardship for the Inland Empire Utilities Agency, which included the Santa Ana Watershed. e by both efforts to incorporate Lessons learned from this assessment will be incorporated into the pilots by California Forward and Pacific Institute.

Moving Forward to 2023 and Beyond

Outcomes of the pilot studies will be used to refine the indicators as well as the overall Outlook approach. From there, DWR intends to being working with regional partners to develop appropriately-

scaled, watershed-based Outlooks. Planning at a regional scale will help water managers evaluate and consider the interdependencies between physical, biological, economic and social processes, from headwaters to outlets, as well as interbasin interactions. These regional Outlooks are expected to be included in *California Water Plan Update 2023* as well as support statewide planning and inform State investment priorities. DWR recognizes that most of the work to advance sustainable water resources management will occur at regional and local levels.

Moving forward, it is expected that additional data and tools will be developed and employed to strengthen the Outlook approach, evaluate trends, and assess current and future sustainability.

Chapter 3. Recommended Actions to Support Long-Term Sustainability

California's history of investment and innovation must be prelude to its future. The most sustainable accomplishments have been realized by those who worked cooperatively toward common goals, acting in a coordinated way to secure a productive and abundant life for themselves and successive generations of Californians. While its development was sometimes contentious, one of the greatest and most essential accomplishments has been the statewide, interconnected system for using and managing water. Yet, many Californians still face unacceptable risks from flooding and water quality, unreliable water supplies, continued depletion and degradation of groundwater resources, and habitat and species declines.

Although the interconnected water system may be the state's most consequential achievement, it is extremely complex and subject to continually changing natural and human-made conditions. In addition, it provides critical support for other dynamic systems — our ecosystems, social systems, and economic and market systems. Nonetheless, some ecosystems and components of the water supply and flood protection infrastructure are no longer functioning as needed or have exceeded their life cycles. California still depends on many remnants from World War II-era investments and innovations. Moreover, climate change increasingly challenges the viability and efficacy of those natural and constructed systems by having to deal with more pronounced cycles of flood and drought.

Update 2018 focuses on State government program delivery to improve the management and the adaptability of California's water resources and move water resources systems toward sustainability.

State Program Delivery

Given what is at stake for Californians and our complex water management systems, State government must take a leadership role in sustainably managing water and related resources. Update 2018 identifies how the State can be more effective at facilitating and demonstrating progress toward water sustainability; and it emphasizes two State capabilities to assist and empower regional water and resource managers and policy makers by:

- Continuously managing for more sustainable outcomes, and
- Evaluating whether public and private investments and actions produce their intended outcomes and how to adapt over time.

The State requires significant ongoing resources to construct, operate, and maintain facilities it owns or is responsible for (e.g., the State Water Project and the State Plan of Flood Control) and provide technical and financial assistance to local agencies. As described in Update 2013, the State has a role in program delivery in these areas:

- **Assisting regions if they cannot accomplish necessary water resources management services on their own**, such as helping to ensure that all Californians are provided with basic public health and safety. In some circumstances, the State can function as a service provider of last resort and provide basic services itself when justified.
- **Addressing international, interstate, or trans-boundary issues** that extend beyond the geographical reach and jurisdictional authority of local and regional agencies.

- **Leveraging resources and providing economies of scale**.
- **Implementing activities that have broad public benefits and advancing sustainability** through public health and safety, ecosystem vitality, a healthy economy, and opportunities for enriching experiences.

Update 2018 better enables the State to modify and align the delivery of State services related to water management around a shared, statewide definition of sustainability and consistent set of intended outcomes; and track actual outcomes over time. This Water Plan presents of vision of managing water resources for sustainability and improves the foundation for the State to address the issues and challenges identified in Chapter 2.

While it is not possible to achieve or demonstrate sustainability at a point in time, trends and patterns observed over time can demonstrate movement toward or away from sustainability. Moving California towards more sustainable outcomes requires a long-term, consistent, and self-correcting planning and policy-making framework. Update 2018 and subsequent Water Plan updates will provide the State a venue for monitoring, evaluating, recommending actions, and adapting to keep California on a path of sustainablity.

In support of more sustainable water resources management, State government should focus on actions that regions and communities cannot accomplish on their own, which the State can do more efficiently and/or cost-effectively, and actions that provide broad public benefits.

The remainder of this chapter presents actions that can be initiated by the State over the next five years to support a long-term view for the management of water resources toward a sustainable future.

Recommended Actions

This section focuses on short-term, State actions to support the long-term view above and water resources sustainability. The following sections provide recommendations to address critical gaps and urgent needs in order to set the foundation for sustainable water resources management. The actions are organized as follows:

- **Improve Alignment of Agencies' Initiatives and Governance –** A successful transition to managing water resources for sustainability requires more coordinated and aligned efforts from local, regional, State, tribal, and federal levels of governance.
- **Improve Regulatory Framework to Reconcile Environmental Needs and Human Activities –** Managing water resources for sustainability will require a regulatory framework that is designed to support achievement of the four societal values;[9] tied to and informed by regional/watershed planning and implementation efforts, including active planning and investing to enhance ecosystem function and viability; based on an ecosystem reconciliation approach; and tailored for different locations.
- **Provide Water Managers Resources, Knowledge, Skills, and Tools Needed for Data-Driven Decision-Making** –Technical and facilitation assistance from the State to the regions is needed

[9] The societal values are defined as: Public Health and Safety, Healthy Economy, Ecosystem Vitality, and Opportunities for Enriching Experiences.

to strengthen relationships, deepen trust, share information, build institutional capacity, and assess system performance to support managing water resources for sustainability.

- **Modernize and Rehabilitate Water Resources Management Systems –** Managing water for sustainability requires continuous investment in the rehabilitation, modernization, and O&M of existing and future infrastructure (including green and grey) to provide intended outcomes.
- **Provide Sufficient and Sustainable Funding** – Managing water resources for sustainability requires funding (from local, regional, State, and Federal sources) to develop and update high quality regional and state plans and to implement priority actions identified in approved regional and state plans.

Improve Alignment of Agencies' Initiatives and Governance

To improve alignment and governance at the watershed-scale, the following actions are recommended:

- ***Align objectives of local, regional, State, and Federal water and land use management organizations and tribes to appropriate societal values.***

    - Societal Value Legislation
        - The State should evaluate the benefit of codifying the societal values identified in *California Water Plan, Update 2018* for water and related resources management in statute. Legislation would outline the necessity for California water planning and implementation efforts to incorporate societal values and track progress towards managing water resources for sustainability. The codified societal values would include public health and safety, a healthy economy, ecosystem vitality, and opportunities for enriching experiences as presented in this Water Plan Update and define sustainability as an ongoing, resilient, and dynamic balance between the societal values.
    - State Agency Alignment
        - State agencies should realign governance structures, authorities, reporting, and strategic planning to make it possible for all State agencies to cooperate, coordinate, and invest in sustainable and integrated water management activities. Alignment of State agencies to sustainability would allow improved ability for cooperation, coordination, and investment in all of the societal values overcoming barriers that can be caused by narrow mission statements and authorities. For example, this could streamline financial assistance to local and regional agencies from State funding sources for multi-benefit, IWM projects.

- ***Strengthen the alignment of government planning, processes, and tools with regional governance structures so goals and objectives, actions, and tradeoffs can be discussed and evaluated holistically at a watershed scale. The focus on watersheds supports the consideration of the unique and interdependent physical, biological, economic, and social processes and functions of California's watersheds.***

    - Watershed Sustainability Planning Outreach and Recommendations

- DWR should conduct a robust stakeholder outreach process with local, regional, state, and tribal representatives to develop a framework for successful watershed sustainability planning statewide. This effort would identify the lessons learned and build upon the successes of IRWM and GSAs development and implementation. This outreach would begin in 2019 and by 2021, DWR should develop an initial report to the Governor of recommendations for:

  - ❖ Integration of IRWM and GSA planning processes
  - ❖ Delineation of watershed sustainability planning boundaries based on hydrologic basins
  - ❖ Establishing hydrologically-based watershed governance structures, where they do not currently exist
  - ❖ Developing holistic Watershed Sustainability Plans with potential to reduce number of other state-required plans
  - ❖ Establishing stable and sufficient funding mechanisms for watershed management
  - ❖ Supporting robust DACs and Tribal involvement
  - ❖ Linking and consolidating regulations, environmental compliance, and permitting processes to watershed planning
  - ❖ Developing a framework for inter-watershed coordination

  This outreach would continue the work and begin implementation of the recommendations presented in DWR's *Stakeholder Perspectives: Recommendations for Sustaining and Strengthening Integrated Regional Water Management.*[10]

- ***Strengthen relationships with California Native American Tribes that acknowledge and respect Tribes' inherent rights to exercise sovereign authority and ensure that Tribes are incorporated into planning and water resources decision-making processes in a matter that is consistent with their sovereign status.***

  - Lead Agency Definition
    - Change Statute to modify the definition of lead agency under CEQA in government code [CEQA guidelines are codified in Title 14 California Code of Regulations 15000 et seq] to include recognized Tribal Governments.
  - Tribal Involvement in Regional Planning Efforts
    - DWR, in coordination with the Tribal Advisory Committee and State Agency Steering Committee, should prepare recommendations to assure timely and meaningful communication with Tribes and utilize Traditions/Tribal Ecological Knowledge to inform water resources management at the watershed scale. These recommendations will inform the next Water Plan Update and improve understanding of traditional/Tribal Ecological Knowledge by local, regional, and State agencies. Through this effort, Tribes and State agencies should work together to develop strategies and options for ensuring greater and early collaboration regarding water resources sustainability projects, as well

[10] This action would require budget authorization from the Legislature.

as watershed planning and management activities, especially where decisions impact Tribal trust lands and/or traditional territories/homelands. These recommendations should ensure timely and meaningful communication with Tribes and utilize Traditional/Tribal Ecological Knowledge to inform future watershed sustainability planning.

- State Contracting with Tribes
  - As permitted by statute, the Department of General Services should update the State Contracts Manual language and process to reconcile the sovereign status of Tribes. If required, statute should be amended to permit transactions specific to recommended government to government contractual transactions.

Improve Regulatory Framework to Reconcile Environmental Needs and Human Activities

To improve water resources management regulation, the following actions are recommended:

- ***Expand regulatory focus to include a systems oriented approach, rather than just avoiding and mitigating environmental impacts caused by discrete projects, for strategic environmental assessment that reconciles environmental needs and human activities through the dynamic balance of all four societal values at a watershed scale.***

  - Programmatic Environmental Compliance Task Force
    - State leaders should establish and fund a "Programmatic Environmental Compliance Task Force". The Natural Resources Agency and the California Environmental Protection Agency, in collaboration with the Legislature, should jointly convene a task force of local, State, and Federal resources and water management agencies to develop a programmatic environmental compliance process to balance ecosystem functions and human activity by replacing current site-by-site mitigation requirements, as well as expedite permitting of critical maintenance activities and water system improvement projects. This task force would be charged with developing recommendations to:
      - **Reduce impediments** to project implementation and transactional costs caused by regulations and processes
      - **Tie and consolidate regulations and permitting processes to watershed scale** planning, implementation efforts, and long-term system management for sustainability, which should include active planning and investment to enhance ecosystem function and viability
      - **Improve existing tools and processes** to address common challenges and concerns with the current regulatory framework to streamline the permitting process and move beyond traditional project-by-project mitigation. Other ideas to consider include delegation of regulatory authorities and consolidation of permitting efforts and responsibilities.
      - **Consider changes to allow regionally-focused approaches to regulation and investments** for ecosystem reconciliation. Identify options that allow State and Federal regulators to rethink and experiment with more holistic approaches.

The task force should develop a report, summarizing its recommendations, for use by the Legislature and Governor in considering statutory, regulatory and policy adjustments.

- ***Improve existing tools and processes to address common challenges and concerns regarding current regulatory framework.***

    - Ecosystem Restoration Project Permitting
        - The CDFW should evaluate permitting process for ecosystem restoration and enhancement projects and make recommendations on potential statutory alterations to mitigation requirements for restoration projects. Determine approaches the would allow environmental permitting agencies to evaluate restoration projects on a separate track that allows credit for the restoration components of projects. This may include permitting projects that include a restoration component to be exempt from additional mitigation requirements for the impacts of the restoration included as part of the project. Encourage inclusion of restoration components in projects by waiving additional mitigation requirements.
    - Delegation of Federal Permitting
        - State regulatory agencies should work with their Federal permitting agency counterparts to seek delegation of authority to reduce the number agencies involved in the permitting process. Evaluate precedents that exist in CalEPA and Caltrans (for example, Caltrans participation in the Surface Transportation Project Delivery Program, under which Caltrans may assume NEPA responsibilities of the U.S. Department of Transportation Secretary with respect to one or more highway projects in California - Caltrans, 2014).
    - Cooperative Agreements
        - State regulatory agencies should prepare cooperative agreements for permit reviews among multiple regulatory agencies to increase efficiency. Agencies should seek to reduce the number of regulatory agencies with which a project proponent must coordinate as well as enable sharing of limited resources, such as staff.

Provide Water Managers Resources, Knowledge, Skills, and Tools Needed for Data-Driven Decision-making

To develop long-term capacity and support a culture of learning and adapting throughout California water management, the following actions are recommended:

- ***Use best available science, data, tools, traditional ecological knowledge, and when necessary, develop, promote, and implement new technologies and innovations, to support data-driven decision making and policies to ensure water management stays on a sustainable path and investments are resilient.***

- Climate Science and Monitoring Program[11]
  - Annual funding should be authorized for climate science and monitoring to support the monitoring and scientific understanding of the role of the climate system in extreme precipitation events, in order to better inform water management during extreme events and changing snowpack. Support ongoing research collaborations including tracking atmospheric rivers, rain/snow trends, upland watershed monitoring, Paleohydrology, sea-level rise, and seasonal winter outlooks should be funded by this program, as well as ensuring climate science and best available information is used to modernize the water resources management system.
- Comprehensive Water Resources Data Collection and Management Program[12]
  - Establish and fund a "Comprehensive Water Resources Data Collection and Management Program" to assist local and regional entities to build regional capacity by developing, monitoring, maintaining, and sharing information, data, models, and other tools. State agencies should work with regions to determine data and data management needs. State agencies should publish and update quarterly State-held water and ecological datasets on a comprehensive and open data platform.[13] State agencies should also maintain minimum protocols, as well as best practices protocols, for data sharing, documentation, quality control, public access, and promotion of open-source platforms and decisions support tools related to water and ecological data.
- Watershed Sustainability Outlooks
  - DWR should engage regional stakeholders to develop and maintain the Watershed Sustainability Outlooks, as introduced in Chapter 2, to provide a regional scale snapshot and evaluation of the metrics or indicators demonstrating movement toward sustainability including the status of water related contributions to public health and safety, healthy economy, ecosystem vitality, and opportunities for enriching experiences. The Outlooks should include an assessment of the efficacy of governance, regulations, and funding of water resources management activities Statewide and for individual regions. From this base of understanding of current conditions, DWR would work with regional stakeholders to define regional scale intended outcomes and recommended actions to achieve them. To enable effective collaboration around this effort, DWR will develop tools to allow collection of information needed to assemble the Watershed Sustainability Outlooks. The Watershed Sustainability Outlooks should be used to inform updates of the California Water Plan and future Watershed Sustainability Plans. Prior to Update 2023, Watershed Sustainability Outlooks will be developed for the 10 hydrologic regions and a determination will be made if subsequent Watershed Outlooks are needed at a more refined scale.
- Thematic Plans

[11] This action would require budget authorization from the Legislature.
[12] This action would require budget authorization from the Legislature.
[13] Required under AB 1755, Water Code section 12410.

- The appropriate State agencies should develop and maintain thematic plans that define strategies and processes as well as intended outcomes to support sustainable water resources management at the thematic level. Thematic areas include flood management, water supply reliability, water quality, ecosystems, and people and water (i.e., recreation, social and cultural uses, and aesthetics). These plans should include statewide as well as regional overviews of the specific resource area. These plans should be updated every five years and over time should incorporate information from future Watershed Sustainability Plans.

- Plan Alignment
  - DWR should evaluate timing of all legislatively mandated, water resources-related plans and make recommendations for modifying any legislatively mandated deadlines to ensure effective and efficient roll up of information into the Water Plan. Ideally, all required state agency plans related to water management activities would be completed at least 2 years before the next Water Plan update (for example, the CVFPP was released in 2017, as required by legislation, just months before the pubic draft of Update 2018). Stagger the release of required plans to allow for better integration and roll up of information. Thematic Plans recommended above should also be completed at least 2 years before Water Plan updates to ensure information from these plans is used to develop the Water Plan. Recommendations should also ensure that the timing of required local plans best allows for utilization of local information in required state plans and that local and regional plans should be aligned and consolidated to reduce duplication and inconsistency and help inform GSPs, IRWM Plans, and ultimately, Watershed Sustainability Plans.

- Statewide Water Storage Program[14]
  - DWR should establish on ongoing Statewide Water Storage Program to evaluated surface and groundwater storage opportunities in the state and provide technical support to local and regional water agencies and GSAs. As an initial Program deliverable, DWR should prepare a statewide evaluation to identify the benefits, costs, hydrologic & engineering, environmental attributes, and other tradeoffs and feasibility indicators regarding surface and groundwater storage opportunities, including optimal locations for groundwater recharge, throughout California. Such an evaluation should inform the potential role of surface and groundwater storage in advancing recent and emerging State initiatives, future bonds/initiatives, and watershed sustainability. The statewide storage evaluation should reflect 21st century planning conditions and drivers that include: seeking strategies that provide multiple benefits; taking a system wide planning approach; planning transparency; changing societal values/goals; changing hydrology and water supply under a changing climate; and improved assessment tools. This study should provide an assessment of feasible storage and recharge opportunities throughout the state and should be a companion to the Water Availability for

[14] This program would require new authorization and ongoing funding from the Legislature.

Replenishment (WAFR) Study. This study should also demonstrate State government leadership in the form of regional capacity-building and partnerships as most local and regional entities do not have the resources or technical ability to conduct such an evaluation across jurisdictions. This activity should be designed to assist in implementing the Sustainable Groundwater Management statutes and Action 6 of the Water Action Plan (Expand Water Storage Capacity and Improve Groundwater Management).

- Regional Engagement in Update 2023
  - Through the Water Plan Update 2023 process, DWR should continue utilizing an enhanced regional planning process and regional forums to effectively engage and empower RWMGs, GSAs, and other existing regional and local entities that are foundational to effective regional planning and management. DWR and participating local and regional entities should establish working groups and venues at regional scales for collective representation to State government that are large enough to effectively interface with State government yet small enough to effectively plan, implement, and manage areas defined by unique hydrologic and ecosystem conditions. These regional working groups will shape Water Plan Update 2023 recommendations for State actions and investments specific to each hydrologic region in the following areas:
    - Shared vision & values
    - Policy and investment priorities unique to each region
    - Water management and investment needs
    - Watershed Sustainability Outlooks
    - Explore opportunities to integrate and reconcile local plans and State statues that are mutually supported by State and regional representatives (e.g., GSPs, UWMPs, land use decision-making, and flood management)
    - Develop Regional Reports and/or Atlas for Update 2023, which will contain:
      - Identification of State's desired outcomes
      - Identification of shared State/regional desired outcomes
      - State Investment in shared outcomes for each area
      - Recommend State incentives and funding sources
      - Implementation Plans

- ***Strengthen regional integrated water management planning, track program performance, and report intended versus actual outcomes on regular cycles to promote continuous learning and adaptation.***

  - State Agency Performance Tracking and Reporting
    - State agencies should develop, maintain, and make available data and information management systems needed to conduct the system performance assessments and to support integrated planning and implementation for sustainability including water budgets, system assessment and performance, and ecosystem conditions. State

agencies should collect data and information needed to develop the Sustainability Outlook on an annual basis.[15]

- Reporting Requirements for State Funding
  - State agencies should require performance tracking and reporting for all projects funded or partially funded with State funds. All planning and implementation efforts should address societal values and track progress towards achieving sustainable water resources management. Additionally, State agencies should require performance tracking and reporting on the societal values and sustainability in grant program guidelines and proposal solicitation packages. Language should be standardized in grant program guidelines and proposal solicitation packages across programs, and in authorizing bond language, so links to sustainability and the societal values and consistent. Progress towards achieving sustainable water resources management at a regional scale should be tracked and documented in Watershed Sustainability Outlooks and future Watershed Sustainability Plans.

- ***Provide technical and facilitation assistance and improve access to data and tools for under-represented and economically-disadvantaged communities to facilitate their participation in planning efforts at all planning scales.***

  - DAC Planning Support
    - State agencies should support disadvantaged community involvement through technical, facilitation, and funding assistance for sustainable water resources management. State agencies should engage proactively and consistently with different local, regional, State, and Federal agencies in order to promote more effective integration and cooperation. Appropriate State agencies should create DAC liaison positions to seek candidates that have adequate qualifications and understanding of disadvantaged communities' needs to support more effective integration.

Modernize and Rehabilitate Water Resources Management Systems

To modernize and rehabilitate the water management system, the following actions are recommended:

- ***Undertake modernization and rehabilitation of water- and flood-related infrastructure to reduce risks associated with aging and/or deficient infrastructure and the effects of climate change.***

  - Statewide Water Management System Assessment Program[16]
    - A Statewide Water Management System Assessment Program should be established for water managers to gain a better understanding of the current status of statewide water infrastructure and its ability to perform the desired level of service, and support sustainable water resources management. The program will allow local, regional, and

[15] This program would require authorization and ongoing funding from the Legislature.
[16] [9] This program would require authorization and funding from the Legislature.

state water managers to assess water resources management systems for critical deficiencies, remaining useful life, climate resiliency, potential effects of subsidence, or modernizing benefits, as needed. Results should be used to prioritize funding for a Statewide Water Infrastructure Modernization and Rehabilitation Program. Results should also be considered in the development of Watershed Sustainability Outlooks and future watershed sustainability planning.

- Statewide Water Infrastructure Modernization and Rehabilitation Program[17]
  - A Statewide Water Infrastructure Modernization and Rehabilitation Program should be established to extend California's water infrastructure's life cycle to at least 2050 and ensure systems are rehabilitated from the effects of subsidence, resilient to a changing climate, and provide flexibility for managing water resources into the future. This program should include undertaking major rehabilitation, replacement, and new facilities that promote modernization of water and flood related infrastructure. Modernization and rehabilitation funding should capitalize on local and federal cost-sharing. The program should utilize an integrated approach to rehabilitation and modernization, including ecosystem restoration and climate change adaptation. This program should be informed by the results and prioritization established in the Statewide Water Management System Assessment Program. Results of this program should be tracked and reported routinely to assess the attainment of the intended outcomes. Results should also be considered in the development of Watershed Sustainability Outlooks and future watershed sustainability planning.

- ***Ensure facility operations and maintenance practices are based on current, best available data and management practices, and operating plans and manuals are routinely updated, as appropriate for the facility type.***

  - Statewide Water Management System Operations and Maintenance (O&M) Assessment Program[18]
    - A Statewide Water Management System Operations and Maintenance Assessment Program for water managers should be established to gain a better understanding of the current status of the operations of water infrastructure statewide and its ability to perform the desired level of service and support sustainable water resources management. The fund should allow local, regional, and State water managers to assess, on a system scale (i.e., larger infrastructure/systems, not at the equipment scale), deferred maintenance, outdated operational procedures and manuals, and operational changes needed to address extreme hydrology, increase aquifer replenishment, reconcile O&M activities with ecosystem vitality, and modernize benefits (i.e., reoperation). The assessments should be updated every 5 years, or a timeframe appropriate based on the facility and local conditions (i.e., susceptibility to changing physical conditions and hydrology). Results of this assessment program will be

[18] [11] [12] This program would require authorization and funding from the Legislature.

used to prioritize funding for a Statewide O&M Modernization Program. Results should also be considered in the development of Watershed Sustainability Outlooks and future watershed sustainability planning.

- Statewide O&M Modernization Program[19]
  - A Statewide O&M Modernization Program should be established to help extend California's water infrastructure's life cycle for another 50 years by reducing deferred maintenance, undertaking modernization of water and flood related O&M procedures and manuals, providing for resiliency to extreme hydrology (e.g., floods and droughts), reconciling O&M needs with ecosystem vitality, and modernizing benefits through reoperation. Allocate funding for implementation of a comprehensive and effective O&M modernization program. Funding should capitalize on local and federal cost-sharing. The program should be informed by information and prioritization established in the Statewide Water System O&M Assessment Program. Results of this program should be tracked and reported routinely to assess the attainment of the intended outcomes. Results should also be considered in the development of Watershed Sustainability Outlooks and future watershed sustainability planning.

- ***Promote the use of vegetation, soils, and other elements and land use practices, such as working landscapes and mountain meadow and forest management to restore some of the natural processes required to manage water and create healthier urban, rural, and natural environments.***

  - Statewide Green Infrastructure and Working Landscapes Task Force[20]
    - A Task Force to review alternatives and establish a framework for developing a conservation easement program that supports green infrastructure and working landscapes and considers protection of groundwater recharge areas should be established. The Task Force should prepare a report summarizing its findings and recommendations for use by the Legislature and the Executive Branch in developing statute, regulations and policy.
  - Integrated Land Use and Water Management Implementation Program[21]
    - An Integrated Land Use and Water Management Implementation Program should be established to promote the integration of working landscapes and water management activities. This program should be designed to enable the State to improve the integration of its own infrastructure as well as provide technical and financial assistance to local and regional agencies. As part of this program, DWR, in consultation with the U.S Army Corps of Engineers, regional flood agencies, GSAs, and landowners, should prepare a comprehensive plan for using flood flows to reduce flood risk within the SPFC, remediate groundwater overdraft and subsidence, reconnect floodplains, and improve ecosystems,

[21] This program would require authorization and funding from the Legislature.

drought preparedness, and water quality. The plan should examine expanded flood bypasses and flood easements in conjunction with groundwater recharge strategies, including groundwater banking and storage, using agricultural and grazing lands for recharge, expanded conveyance of flood flows to recharge areas, and reoperation of reservoirs for early releases of water for recharge prior to storms.

Provide Sufficient and Sustainable Funding

To ensure sufficient and sustainable funding for water resources management activities over time, the following actions are recommended:

- **Commit to consistent, ongoing, State investment designed to deliver specific long-term outcomes that contribute to the societal values.**
    - Investment Prioritization
        - State government should prioritize investments based on expected contribution of a program or project to the societal values, cost effectiveness, and ability to improve watershed resiliency.
- **Use consistent, reliable, and diverse funding mechanisms, with an array of revenue sources, to support managing water resources for sustainability, including ongoing management actions and capital projects.**
    - Remove Funding Barriers
        - DWR will engage local water managers and elected officials to compile strategies and best practices to remove barriers to local and regional funding for water projects. DWR, in consultation with Executive Branch agencies, will make recommendations to clarify the 1996 Right to Vote on Taxes Act's (Proposition 218) applicability to water related fees and taxes, including potential legislation if necessary. The State will also identify limitations to implementing multi-district/multi-benefit projects, such as using fees from assessment districts for out of district actions, will be reviewed.
    - Investing in Water Resources Sustainability Task Force[22]
        - In collaboration with the Legislature, the Executive Branch should convene a task force to identify changes to existing funding mechanism requirements, as well as new funding mechanisms. Novel funding sources may include an assessment at the watershed scale to help fund the public benefits of water projects or a statewide flood insurance program for funding flood management activities. The task force should also assess the following: areas where users may not be fully funding the costs or impacts associated with their use, instances where polluters are not able to diminish their pollution and have not adequately accounted for the impacts of that pollution, and opportunities to use fees to incentivize positive behavior. Changes to cost shares and area of benefit

[22] This action would require authorization and funding from the Legislature.

requirements should also be reviewed. The task force will provide recommendations to the Legislature and Administration on fees, who would pay them, how they would be collected, and how they would be used.

Summary Table of Recommendations

Table 1 provides a summary of how the actions described above could support sustainability and a range of costs and time to implement. How each action may support sustainable water resources management in California is scored by determining if the action has an indirect, low, moderate, or high potential to contribute to the four societal values. The potential range of annual costs for each of the identified actions is identified by the following ranges of costs:

$	< $2 million
$$	$2 million - $10 million
$$$	$10 million - $50 million
$$$$	$50 million - $200 million
$$$$$	$200 million - $500 million
$$$$$$	$500 million+

Table 1 also identifies the potential range of time to implement each of the identified priority actions. The ranges of time are:

1-2 years
3-5 years
Over 5 years
Continuous

Table 1. Summary of How the Policy Recommendations and Prioritized Actions Support the Societal Values and the Estimated Cost and Time to Implement the Actions

Policy Recommendation / Prioritized Actions	Societal Values				Agency Alignment	Operational and Regulatory Efficiency	Annual Cost	Time to Implement
	Healthy Economy	Public Health & Safety	Thriving Ecosystems	Enriching Experiences				
Improve Alignment of Agencies' Initiatives and Governance								
Societal Value Legislation	i	i	i	i	●	◑	$	1-2 years
State Agency Alignment	i	i	i	i	●	◑	$	1-2 years
Watershed Sustainability Planning Outreach and Recommendations	i	i	i	i	●	●	$	1-2 years
Lead Agency Definition	i	i	i	i	◑	◑	$	1-2 years
Tribal Consultation	i	i	i	i	●	◑	$	1-2 years
State Contracting with Tribes	i	i	i	i	◑	◑	$	1-2 years
Improve Regulatory Framework to Reconcile Environmental Needs and Human Activities								
Programmatic Environmental Compliance Task Force	i	i	●	i	●	●	$	1-2 years
Restoration Project Permitting	i	i	●	i	◑	●	$	1-2 years
Delegation of Federal Permitting	i	i	i	i	●	●	$	1-2 years
Cooperative Agreements	i	i	i	i	●	●	$	1-2 years
Provide Water Managers Resources, Knowledge, Skills, and Tools Needed for Data-Driven Decision-making								
Climate Science and Monitoring Program	i	i	i	i	◑	◑	$$	Continuous
Comprehensive Water Resources Data Collection and Management Program	i	i	i	i	◑	●	$$$	Continuous
Watershed Sustainability Outlooks	i	i	i	i	●	◑	$	Continuous
Thematic Plans	●	●	●	●	●	◑	$$	Continuous
Plan Alignment	i	i	i	i	●	◑	$	1-2 years
Statewide Water Storage	i	i	i	i	◑	◑	$	Continuous

Policy Recommendation / Prioritized Actions	Societal Values				Agency Alignment	Operational and Regulatory Efficiency	Annual Cost	Time to Implement
	Healthy Economy	Public Health & Safety	Thriving Ecosystems	Enriching Experiences				
Reconnaissance Program								
Regional Engagement in Update 2023	i	i	i	i	◑	◑	$	3-5 years
State Agency Performance Tracking and Reporting	●	●	●	●	◑	●	$	Continuous
Reporting Requirements for State Funding	●	●	●	●	◑	◑	$	1-2 years
DAC Planning Support	●	●	●	●	●	◑	$	Continuous
Modernize and Rehabilitate Water Resources Management Systems								
Statewide Water Infrastructure Asset Assessment Program	i	i	i	i	◑	●	$$$$	3-5 years
Statewide Water Infrastructure Modernization and Rehabilitation Program	●	●	●	●	◑	●	$$$$$$	Continuous
Statewide Operations and Maintenance (O&M) Assessment Program	i	i	i	i	◑	●	$$$$	Continuous
Statewide O&M Modernization Program	●	●	●	●	◑	●	$$$$$	Continuous
Statewide Green Infrastructure and Working Landscapes Task Force	●	●	●	●	●	◑	$	1-2 years
Integrated Land Use and Water Management Implementation Program	●	●	●	●	●	●	$$	Over 5 years

i	Potential indirect contribution to this outcome
○	Low potential contribution to this outcome
◑	Moderate potential contribution to this outcome
●	High potential contribution to this outcome

$	< $2 million
$$	$2 million - $10 million
$$$	$10 million - $50 million
$$$$	$50 million - $200 million
$$$$$	$200 million - $500 million
$$$$$$	$500 million+

Chapter 4. Investing in Water Resources Sustainability

California is a state of great opportunity even as a significant number of water resources issues threaten its diverse ways of life, its economic health, and its rich biodiversity. One long-standing foundational challenge to water resource resilience and reliability in California is the lack of stable and adequate funding. Funding solutions that leverage opportunities, create stability, prevent degradation, and address risks, will require investments in water resources management that fund:

- Expansion and improvement of existing water resources management systems (including green and grey).
- Ongoing efforts to operate, maintain, support, and track systems.
- Repair, rehabilitate, and replace existing aging systems.
- Planning for the future.

Without these investments, risks will continue to grow and the ability to realize the full potential of the State's water resources will be lost.

California Water Plan Update 2018 (Update 2018) presents a major improvement in the way water policy and management priorities can be identified and implemented at local, regional, and State levels. This chapter, provides options to achieve sufficient and stable funding and provides decision makers with an assessment of the trade-offs required to sustainably manage its water resource assets.

Annual historical funding will not support State actions to meet the level of investment needed for long-term sustainability. California water resources management agencies have identified approximately $100 billion in potential infrastructure investment need. In addition, there are ongoing funding needs to support planning, data management, and State operations and maintenance of approximately $1.2 billion annually as well as recommended actions proposed in Chapter 3 (summarized on Table 3-1). While the potential funding need is substantial, it does not capture all of the water resources management need statewide.

Addressing these risks and opportunities will require local, State, and Federal agencies to work together to find and fund solutions. Funding of investment in water resources management in California will require an approach that (a) distributes needed expenditures over time, (b) identifies a mix of mechanisms to maximize local, State, and Federal investment, (c) accounts for external realities, and (d) supports a balanced investment in new infrastructure, ongoing needs, and addressing aging and deficient systems. The Water Plan approach to funding focuses on delivery of a long-term statewide program to improve the sustainability of water resources management.

An Approach to Funding Water Resources Management Sustainability

The approach to funding water resources management in California is focused on capital needs, in addition to ongoing State[23] needs. Renewed support for ongoing needs is important because funding has declined over time, resulting in large and sometimes reactive capital investments to repair,

[23] Funding that sustains benefits from past investments and/or increases the efficiency, effectiveness, and probability of desired outcomes from future water policy and investment.

rehabilitate, or replace existing systems. The State must fund and maintain, on a consistent and reliable basis, the conditions that support proactive and sustainable water resources management actions, including:

- Sufficient institutional capacity and capability (e.g., staff, tools, and funding) to support planning, monitoring, data management, and performance tracking.
- Sufficient staff and funding for operations and maintenance.
- Coordinated governance and permitting, organized around a common set of intended outcomes.
- Support for the continual coordination of land use, water, and floodplain management.
- Capital actions to address deferred maintenance, technological advancements, and emerging water needs.

The Water Plan will use a 50-year phased funding approach to support investment in actions that contribute to sustainability, track results over time, and has flexibility to adapt to the changing needs of California. Also, a 5-year implementation plan is provided that outlines short-term actions and funding needs.

As shown in Figure 4-1, the approach to funding water resources management was developed by taking into account quantitative inputs and qualitative considerations to identify funding-specific findings. These findings focused on providing insight into:

- How much funding is needed for each phase
- What management actions are funded in each phase
- What management actions are not funded
- How do priorities and inputs affect funding and phasing of funding

The findings bring together quantitative analysis and qualitative considerations to explore tradeoffs between available funds, cost shares, and investment phasing. These considerations were developed to provide decision-makers with a knowledge base to use in identifying a funding approach that maximizes the return on investment for implementing recommended actions, as well as capital and ongoing water resources management needs in California.

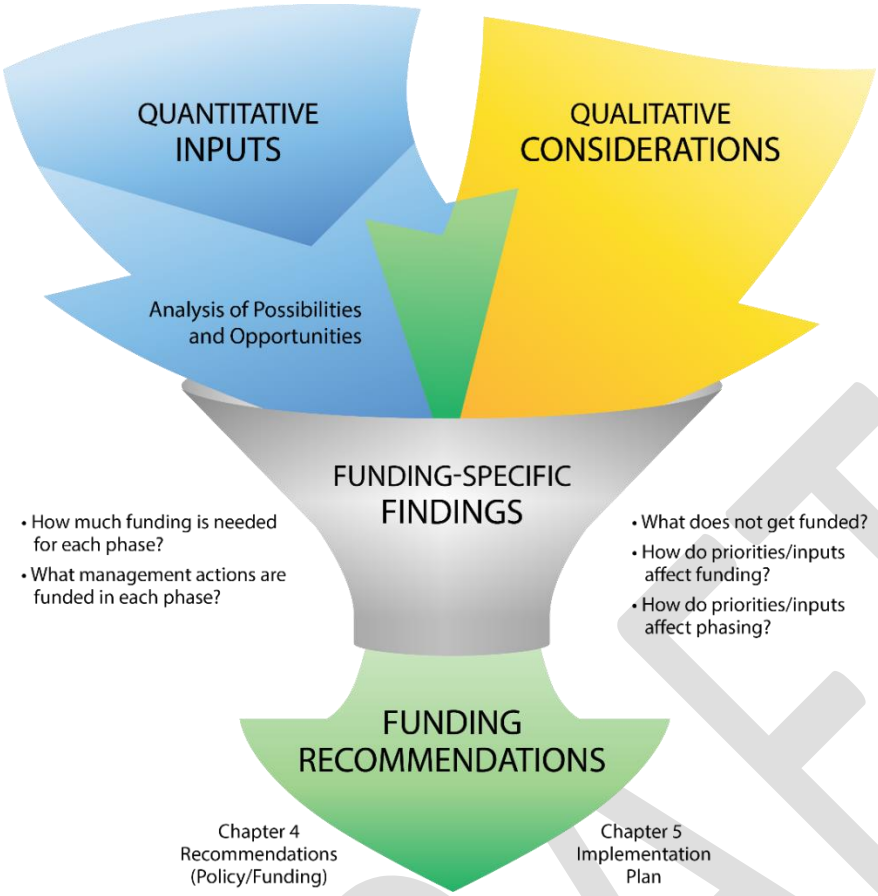


Figure 4-1: An Approach to Analyze Funding for Water Resources Management in California

Quantitative Analysis of Funding

The quantitative analysis of funding investigated possibilities and opportunities for funding California's water resources management needs. This was accomplished by exploring the implications of different constraints on funding by testing how:

- Different levels of funding impact what and when management actions are funded
- Different mixes of funding mechanisms impact what and when management actions are funded
- Different priorities impact what and when management actions are funded
- Cost shares impact what and when management actions are funded
- Implementation of recommended actions (Chapter 3) impact what and when management actions are funded

To perform the analysis, quantitative inputs were considered including:

- **Funding Needs** – Funding needs in California were collected from local agencies, regional plans, and unfunded State grant requests. These planned and proposed projects were aggregated into 25 capital and 17 ongoing management action categories under five thematic areas (i.e., flood management, water supply reliability, water quality, ecosystem management, and people and water). California water resources management agencies identified approximately $100 billion

in planned and proposed capital projects. In addition, there are ongoing funding needs to support planning, data management, and state operations and maintenance of approximately $1.2 billion annually. Identified capital and ongoing water management represent the best and readily available information but do not represent the complete statewide water resources management need because (a) only a small sample of representative agencies were interviewed statewide, (b) some communities and agencies within the State do not have the resources or institutional capacity necessary to identify water management needs, (c) operation and maintenance needs statewide have not been assessed, and (d) ongoing needs from all State agencies with water resources management responsibility were not available.
Tables 4-1 through 4-2 provide the capital and ongoing water resources management needs in California. In addition, the funding required to implement the recommended actions outlined in Table 3-1 were included in the analysis.

- **Funding Mechanisms** – There are a number of mechanisms that can be used to fund water resources management in California. Tables 4-3 and 4-4 provide a list of funding mechanisms, along with the appropriateness (nexus and applicability), potential availability (inter-annual reliability), cost shares (minimum and maximum percentage that can be funded), historical funding (average annual amount funded over last 10-years), and viability (political viability) for funding different capital or ongoing management actions. The funding mechanisms include: (1) existing, authorized funding streams, such as the general fund, taxes, fees, or assessments, (2) limited-duration capital funding mechanisms, such as GO bonds or local bonds, and (3) water management fees.

Table 4-1. Capital Water Resources Management Needs in California (2016 Dollars)[1]

Thematic Area	Category	Example	Identified Need ($ Million)
Flood Management	Urban Infrastructure	Levees, pump stations, dams, storage, weirs, gates, and other hydraulic structures	$23,880
	Rural Infrastructure	Levees, pump stations, dams, storage, weirs, gates, and other hydraulic structures	$2,180
	Nonstructural	Easements, land acquisition, setbacks levees, floodproofing, etc.	$1,830
	Transitory Storage/Bypasses	Off-channel storage, bypasses, large-scale setbacks, floodplain storage	$7,280
Water Supply Reliability	Surface Storage	Reservoir, weirs, pump stations, inlet/outlet structures, and other hydraulic structures	$23,980
	State Water Project (Capital)	SWP reservoir, weirs, pump stations, inlet/outlet structures, and other hydraulic structures	Under development
	Groundwater Storage and Facilities	Recharge basins, drilling, pumps, piping, and other hydraulic structures	$3,050
	Conjunctive Use	Drilling, pumps, piping, and other hydraulic structures associated with groundwater recharge	$190
	Conveyance	Pipes, canals, pump stations, diversion/inlet structures, and other hydraulic structures	$10,020
	Contracts (Transfers)	Water trades, transfers, agreements, and water rights	$410
	Recycled Water	Treatment trains/process, pumping, piping, waste disposal and other hydraulic structures	$6,370
	Desalination	Treatment trains/process, pumping, piping, waste disposal and other hydraulic structures	$1,640
	Agricultural WUE Measures	Irrigation efficiency projects, capture and reuse of drainage, measures to reduce water usage	$20
	Urban WUE Measures	Metering, WaterSmart irrigation systems and landscaping, and high efficiency fixtures/processes	$1,390
	Precipitation Enhancement	Cloud seeding, hail suppression, and fog dispersal	$0
Water Quality	Groundwater Remediation	Treatment trains/process, concentrate management, piping, pumping, and hydraulic structures	$500
	Water/Wastewater Treatment	Treatment trains/process, piping, pumping, and other hydraulic structures	$13,390
	Stormwater resources management	Diversion, LID features, BMPs, and non-point source elimination programs	$560
Ecosystem Management	Recovery Activities	Recovery beyond mitigation (e.g., hatcheries, spawning ground recovery, and pollutant clean-up)	N/A
	Mitigation Activities	Barrier and invasive species removal; floodplain, wetland, and geomorphic process restoration; etc.	$1,560
	Ecosystem Services and Natural Infrastructure	Reconnection of habitat including agricultural land flooding (flows and easement); recharge of storm flows	$170
People and Water	Recreation	Infrastructure for recreational activities including trails, parks, and boating	$230
	Cultural, Historical, Social, and Aesthetics	Infrastructure for tribal, agricultural, and other cultural resources	$2
Notes:		Total	$98,652

[1] Based on best available plans and information. Plans and associated funding needs are generally constrained by existing planning capacity, funding constructs, and funding levels; therefore, they do not necessarily represent the full funding needs.

BMP – Best Management Practices; LID -Low Impact Development; SWP- State Water Project; WUE- Water Use Efficiency

Table 4-2. Ongoing Water Resources Management Needs in California (2016 Dollars)[1]

Thematic Area	Category	Example	Identified Need ($ Million/Year)
Flood Management	Residual Risk and Floodplain Management	Emergency preparedness/planning, risk awareness, public education, and outreach programs	$110
	Baseline Operations and Routine O&M	Routine maintenance of infrastructure	$390
	Data Management, Tools, Planning and Tracking Performance	Acquisition/upkeep of data, tools, and models; planning, outcome tracking; and administrative activities	$140
Water Supply Reliability	Groundwater resources management	GSA establishment, coordination; planning; and state assistance for GSAs	$30
	Drought Preparedness	Drought emergency preparedness (planning, training, modeling, coordination, and data management)	<$1
	Operational Activities	Ongoing operation, expenses, and maintenance activities, institutional capacity and capability	$90
	State Water Project (O&M)	State Water Project Operations and Maintenance	Under development
	Data Management, Tools, Planning, and Tracking Performance	Acquisition and upkeep of data, tools, and models; planning, outcome tracking; and administrative activities	$210
Water Quality	Emergency Preparedness	Preparedness, response, and recovery activities for water quality incidents	$0
	Operational Activities	Ongoing operation, expenses, and maintenance activities, institutional capacity and capability	$20
	Watershed Management	Operation, maintenance, expenses, planning, and coordination activities	<$1
	Data Management, Tools, Planning, and Tracking Performance	Acquisition and upkeep of data, tools, and models; planning, outcome tracking; and administrative activities	$10
Ecosystem Management	Emergency Preparedness	Preparedness, response, and recovery activities such as operations to catch and transport stranded fish and other species	N/A
	Operational Activities	Operation, maintenance, expenses, planning, coordination, institutional capacity and capability building	$30
	Data Management, Tools, Planning, and Tracking Performance	Acquisition and upkeep of data, tools, and models; planning, outcome tracking; and administrative activities	$60
People and Water	Operational Activities	Management, operation, and maintenance of recreational areas, cultural sites, and historic sites, access/hunting permits, protection of aesthetic sites, and conservation of agricultural lands	$50
	Education	Education, informational, and outreach programs at historic, cultural, parks, or other sites	<$1
	Data Management, Tools, Planning, and Tracking Performance	Acquisition and upkeep of data, tools, and models; planning, outcome tracking; and administrative activities	<$1
		Total	$1143

Notes:
[1] Based on best available plans and information. Plans and associated funding needs are generally constrained by existing planning capacity, funding constructs, and funding levels; therefore, they do not necessarily represent the full funding needs.
GSA -Groundwater Sustainability Areas; O&M – Operations and Maintenance

Table 4-3. Summary of Existing Funding Mechanisms

Funding Mechanism	Description	Historical Expenditures[1]
Local		
Benefit Assessments	A common mechanism for funding local actions that provide special benefits to identified properties. New or increased benefit assessments would require a property owner or a registered voter vote (depending upon specific circumstances). Benefit assessments would be limited and not able to fund general benefits such as habitat restoration.	N/A – Variable
Developer Fees	Fee charged for specific aspects of property development or improvement. The amount of the fee must be related to burdens imposed by the development on public infrastructure or services. The amount collected from fees varies with extent of development	N/A – Variable
Enhanced Infrastructure Financing Districts (EIFDs)	EIFDs allows for a separate government entity to be created by a city or county within a defined area to finance infrastructure projects with community-wide benefits. EIFDs are financed through tax increment generated from the growth in property taxes collected from within a designated district boundary. EIFDs assist with financing the construction or rehabilitation of a wide variety of public infrastructure and private facilities. The use of the assessments within these districts will vary based on how the EIFD is established.	N/A- New
General Fund	A fund used for the daily and long-term operations of public agencies. The general fund is typically supported with revenues that are collected on a regular basis with few restrictions on the use of those funds, such as ad valorem property and sales taxes. The general fund can be used for capital, O&M, and ongoing actions.	$850M/yr
General Obligation Bond	A general obligation (GO) bond is a municipal bond backed by the full faith and credit of a jurisdiction (the local agency or entity) rather than solely by the revenue of a specific project. Issuance of GO bonds requires a vote. Time is required to prepare language for the bond measure for the statewide vote, as well as a time lag before funds would be available after passage. GO bonds are generally used to fund capital actions. The State must pay back the principal (amount raised), plus bond issuance cost, and interest over the life of the bond.	
Special Tax	A tax imposed for a specific purpose. Special taxes must be approved by a super majority of the qualified voters in the service area.	N/A – Variable
State		
General Fund	A fund used for the daily and long-term operations of the State. The general fund is typically supported with revenues that are collected on a regular basis with few restrictions on the use of those funds, primarily income and sales taxes. The general fund can be used for capital, O&M, and ongoing actions.	$150M/yr
General Obligation Bond	A GO bond is a municipal bond backed by the full faith and credit of a jurisdiction (the State) rather than solely by the revenue of a specific project. Issuance of State GO bonds requires a statewide vote. Time is required to prepare language for the bond measure for the statewide vote, as well as a time lag before funds would be available after passage. GO bonds are generally used to fund capital actions. The State must pay back the principal (amount raised), plus bond issuance cost, and interest over the life of the bond.	$1,400M/yr
Greenhouse Gases (GHG) Cap-and-Trade Program Fund	A market based program to reduce GHG emissions using a cap and trade program that includes an annually declining limit on GHG emissions. The State sets an annual cap on total emissions and auctions off emission allowances to GHG emitters, who may subsequently buy or sell allowances among themselves. For the auction proceeds to be used to fund water resources management actions, the action must show a nexus in reducing GHG emissions.	N/A – Variable
State User Fees	A tax or fee based on the principal of either a beneficiary paying for a service or good, or a polluter paying for costs associated with damages to the environment. Examples include: State Water Resources Control Board Drinking Water, Water Quality, and Water Rights fees. A user fee requires legislation that stipulates the types of benefits that can be assessed actions permitted under the fee.	N/A – Variable
Federal		
General Fund	A fund used for the daily and long-term operations of the Federal government. The general fund is typically supported with revenues that are collected on a regular basis with few restrictions on the use of those funds. Funding for specific projects must be appropriated by the United States Congress. The general fund can be used to provide funding for capital and planning projects, as well as Federal O&M and ongoing actions.	$415M/yr

Notes:
[1]2016 Dollars – Based on best available plans and information from California Department of Finance.
N/A - Variable: No estimate available as amount varies by agency
N/A – New: Recently implemented mechanism so no historical expenditure information available. Expenditures would vary based on EIFD forming agreement.

Table 4-4. Analysis of Appropriateness of Existing Funding Mechanisms

Funding Mechanism	Inter-annual Reliability (High, Moderate, Low)	Applicability (High, Moderate, Low)	Cost Share Range (Minimum – Maximum)
Local			
Benefit Assessments	High based nexus to benefit	High: capital, OMRR&R, and ongoing actions for water management Low: capital, OMRR&R, ongoing actions unrelated to identified benefit (e.g., ecosystem management) or for actions with a general benefit	Up to 100% for local sponsored infrastructure and planning actions N/A: ecosystem recovery, State operations and administration
Developer Fees	Moderate based on burdens imposed by the development on public infrastructure or services	High: capital and administrative actions N/A: O&M	Up to 100% for local sponsored infrastructure and planning actions N/A: ecosystem recovery and operations
Enhanced Infrastructure Financing Districts	Moderate	High: capital and administrative actions N/A: O&M	Up to 100% for actions identified in forming language N/A: O&M
General Fund	High	High: capital, OMRR&R, ongoing actions	Up to 100% for local sponsored actions
General Obligation Bond	Low	High: Capital actions Low: Ongoing actions	Up to 100% for capital, data, tools, and planning actions N/A: O&M
Special Tax	Moderate based on purpose of tax.	High: capital, OMRR&R, and ongoing actions related to purpose of tax Low: capital, OMRR&R, ongoing actions unrelated to purpose of tax	Up to 100% for local sponsored infrastructure and planning actions N/A: ecosystem recovery, State operations and administration
State			
General Fund	Moderate dependent upon State budgeting	High: OMRR&R and ongoing actions Low: capital actions	20 to 100% for capital, data, tools, and planning actions Up to 100% for ongoing and policy actions
General Obligation Bond	Low	High: Capital actions Low: Ongoing actions	20 to 100% for capital, data, tools, and planning actions N/A: O&M
Greenhouse Gases (GHG) Cap-and-Trade Program Fund	Moderate dependent upon market factors	High: ecosystem and other actions that reduce GHG N/A: capital, OMRR&R, ongoing actions unrelated to GHG reduction	Up to 80% of capital and planning actions that show nexus to GHG reductions
State User Fees	High	High: actions related to benefit N/A: capital, OMRR&R, ongoing actions unrelated to identified fee benefit	Up to 80% of capital and planning actions related to benefit N/A: O&M and policy actions
Federal			
General Fund	Moderate dependent upon Congressional appropriations	High: capital and planning actions, Federal OMRR&R and Federal ongoing actions Low: ongoing actions for local and State level actions N/A: local and State O&M	Up to 50% for capital and planning actions N/A: administrative, O&M, and policy actions

In addition, several potential novel funding mechanisms that could be used to fund water management actions were reviewed. These novel mechanisms include:

- **Watershed or River Basin Assessment**: A watershed or river basin assessment could be used to fund integrated water management as well as provide resources for underfunded areas and communities (e.g., ecosystem management, flood management, disadvantaged communities). The watershed or river basin assessments would be assessed statewide with funding returned to watershed or river basins to support implementation of management actions. Management actions would have to be previously identified in a regional sustainability plan, as well as demonstrate their contribution to water management sustainability. This type of assessment could provide a reliable, stable funding source for regional planning and management action implementation. However, there are a number of complex issues that need to addressed before this type of assessment could be implemented including: (a) what hydrologically-based geographic area would constitute a watershed or river basin, (b) how would agencies collaborate and coordinate and what authorities or legal agreements would be necessary within the basins, (c) how would the assessment be structured and how much funding could be generated statewide, and (d) what requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time.
- **Water Use Surcharge**: A water use surcharge on retail water sales could be used to generate revenue for water projects. The fee could support actions including integrated water resources management. Revenue generated by a water use surcharge would require actions funded to demonstrate a nexus to the tax. There are a number of complex issues that need to addressed before this surcharge could be implemented including: (a) what actions have a nexus to the surcharge, (b) how would the surcharge be structured and how much funding could be generated statewide, and (c) what requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time.
- **Risk Reduction Insurance**: Risk reduction insurance is a funding mechanism that could be used to support funding of management actions to reduce risks from flooding, droughts, climate change, and unreliable water supplies. State sponsored risk reduction insurance would involve the State partnering with private insurers and underwriters to effectively develop a State insurance program. The insurance program would be structured to allow the State to use a portion of the insurance premiums on management actions to reduce risk and the remaining amount to purchase private catastrophic insurance. The private insurance policy would transfer a portion of the risk to the international reinsurance market. For flood management, a risk reduction program could replace the National Flood Insurance (NFIP) program in California. Analysis of NFIP data (1978 to 2008) showed that premiums paid over time by California policy holders totaled five times more than the payouts.[24] A statewide insurance

[24] Wharton Center for Risk Management and Decision Processes. 2011. *Informed Decisions on Catastrophe Risk: Who's Paying and Who's Benefiting Most from Flood Insurance under the NFIP – A Financial Analysis of the U.S.*

program would enable California to use a portion of these premiums for risk reduction. There are a number of complex issues that need to addressed before state insurance could be implemented including: (a) what type of information would be necessary so that premiums could be set to distribute risk fairly and to be acceptable to international reinsurance market underwriters, (b) what type of legal or mandatory mortgage requirements would be necessary to insure properties at risk purchased insurance, (c) how much revenue would be needed from premiums to make risk taken on by the State economically viable, and (d) what requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time.

- **Water Markets:** By building on the existing water exchanges, a water market could be created to generate revenue by assessing a fee or per unit charge for each transfer. The revenue generated could be used to implement management actions. Water markets allow willing buyers and sellers to shift the use of water through exchanges, one-time purchases, short-term leases, long-term leases, or permanent sale of water rights or contract quantities. Water markets vary in size and duration, based on legal, physical, hydrologic, and other circumstances. There are a number of complex issues that need to addressed before water markets could be implemented including: (a) what type of fee or per unit charge would be applied, (b) what type of legislation is needed to develop water markets; (c) how much revenue could be generated, and (d) what requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time.

Tables 4-5 and 4-6 provide an overview of the potential novel funding mechanisms along with the appropriateness (nexus and applicability), potential availability (inter-annual reliability), cost shares (minimum and maximum percentage that can be funded), viability (political viability) for funding different capital or ongoing management actions. These tables also outline the benefits and implementation considerations required to investigate these mechanisms.

National Flood Insurance Program (NFIP). Issue Brief. University of Pennsylvania. Fall 2011. Web site http://opim.wharton.upenn.edu/risk/library/WRCib2011b-nfip-who-pays.pdf. Accessed March 2015.

Table 4-5. Summary of Novel Funding Mechanisms

Funding Mechanism	Description	Benefits	Implementation Considerations
Watershed or River Basin Assessment	A watershed or river basin assessment could be used to fund integrated water management. The watershed or river basin assessments would be assessed statewide with funding returned to watershed or river basins to support implementation of management actions previously identified in a regional sustainability plan.	▪ Can support a wide range of management actions ▪ Can be used to fund regional sustainability planning ▪ Could provide stable, reliable, inter-annual funding for regional integrated water resources management ▪ Could provide funding to support DACs ▪ Could provide funding to State technical and data management resources	▪ What hydrologically-based geographic area would constitute a watershed or river basin ▪ How would agencies collaborate and coordinate/ what authorities or legal agreements would be necessary ▪ How would the assessment be structured ▪ What requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time
Water Surcharge Fee	A water use surcharge on retail water sales could be used to generate revenue for water projects. The fee could support actions including integrated water resources management. Revenue generated by a water use surcharge would require actions funded to demonstrate a nexus to the tax.	▪ Could provide stable, reliable, inter-annual funding ▪ Could provide funding to State technical and data management resources	▪ What actions have a nexus to the surcharge ▪ How would the surcharge be structured ▪ What requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time
Risk Reduction Insurance	Risk reduction insurance could be used to support funding of management actions to reduce risks from flooding, droughts, climate change, and unreliable water supplies. Implementation would involve the State partnering with private insurers and underwriters to effectively develop a State insurance program. The insurance program would be structured to allow the State to use a portion of the insurance premiums on implementing management actions to reduce risk and the remaining amount to purchase private catastrophic insurance.	▪ Can support management actions that reduce risk ▪ Could provide stable, reliable, inter-annual funding for risk reduction measures ▪ Could provide funding to State technical and data management resources ▪ Could replace existing National Flood Insurance Program where Californians are a net payer	▪ What type of information would be necessary so that premiums could be set to distribute risk fairly and to be acceptable to international reinsurance market underwriters ▪ What type of legal or mandatory mortgage requirements would be necessary to insure premiums are being purchased ▪ How much revenue would be needed from premiums to make risk taken on by the State economically viable ▪ What requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time
Water Markets	Water markets allow willing buyers and sellers to shift the use of water through exchanges, one-time purchases, short-term leases, long-term leases, or permanent sale of water rights or contract quantities. Revenue could be generated from water markets by assessing a fee or per unit charge for each transfer, which could be used to implement management actions.	▪ Could provide funding to State technical and data management resources	▪ What type of fee or per unit charge would be applied ▪ What type legislation is needed to develop water markets ▪ What requirements and processes are necessary for distributing funding, tracking and reporting results, and adapting actions over time

Table 4-6. Appropriateness of Novel Funding Mechanisms

Funding Mechanism	Inter-annual Reliability (High, Moderate, Low)	Applicability (High, Moderate, Low)	Potential State Cost Share Range (Minimum – Maximum)

Watershed or River Basin Assessment	High	High	Up to 100% for State services and policy actions Up to 80% of infrastructure and planning actions N/A: O&M
Water Surcharge Fee	Moderate dependent upon resource usage	Moderate dependent upon nexus to fee	Up to 80% of capital, ongoing, and policy actions related to benefit
Risk Reduction Insurance	Moderate dependent upon number of insurance policies purchased	Moderate dependent upon linkage to risk reduction actions	Up to 100% of risk reduction related capital, ongoing, and policy actions
Water Markets	Variable/Moderate dependent upon market factors	Moderate dependent upon nexus to resource benefit	Up to 80% of capital, ongoing, and policy actions

How do different levels of funding impact what and when management actions are funded?

Different levels of funding impact what and when management actions are funded. Large one time expenditures, such as capital management actions, have historically been funded using general obligation bonds as well as local and Federal matching funds. Ongoing and policy level actions, such as planning, data management, and administrative, are typically funded from general funds with some funding from GO bonds. O&M actions are typically funded through general fund and user fees.

The funding needs identified in the Water Plan include more than $160 billion for capital, ongoing, and recommended actions which is more than the $140 billion funding currently available. There is an approximate $20 billion deficiency in spending if water management funding continues at historic levels. Even with increased funding from local, State, and Federal sources, it will be difficult to fund all of the management actions within the 50-year planning horizon because of the expenditures necessary to meet ongoing and recommended actions. Ongoing and recommended actions require significant expenditures due to:

- Insufficient funding levels in the past have resulted in a deferred maintenance and aging systems as well as increasing cost to address these issues
- Emerging issues such as climate change, groundwater management, and ecosystem management require an increased level of investment
- A need to support regional planning efforts including data management, tools, and performance tracking

Also, many of these expenditures are annual expenses that require funding be available each year. Therefore, the timing and amount of funding available impacts whether actions are funded. Also, some management actions currently do not have appropriate funding sources identified to support them. For these actions to be funded, changes may need to be made in funding mechanisms requirements and applicability for different actions.

How do different mixes of funding mechanisms impact what and when management actions are funded?

Different mixes of funding mechanisms change the timing of implementation as well as the amount of funding each management action receives. For capital and some ongoing mechanisms to be funded, matching is required from local and Federal funding sources. To best utilize the available funding mechanisms, the following should be taken into consideration:

- Increasing the amount of funding available from the State general fund will allow more ongoing and recommended actions to be funded.
- Increasing the amount and early issuance of general obligation bonds results in capital actions being funded sooner.
- Increasing funding from local and Federal sources to match State expenditures results in earlier implementation of management actions, especially for capital actions. This early implementation is a result of additional funding becoming available sooner.
- Implementation of some of the novel mechanisms could provide more stable, long-term funding for management actions.

How do different priorities impact what and when management actions are funded?

Historically, investment in water resources management has prioritized capital actions, which has resulted in insufficient funding for ongoing actions. This Water Plan is focused on prioritizing ongoing and recommend actions to address system deficiencies and emerging issues. Prioritizing investment in ongoing actions, should result in decreasing deferred maintenance and improving understanding of sustainability over time. Prioritizing ongoing and recommended actions results in these actions being funded throughout the 50-year planning horizon. However, by changing priorities, capital actions are funded across the fifty-year planning horizon.

How do cost shares impact what and when management actions are funded?

To maximize overall water resources management investment, expenditures must be shared across a number of different local, State, and Federal funding mechanisms. Cost shares can change how much investment is available for expenditures annually as well as when the funding occurs. For example, if a management action requires local cost sharing then the action will be delayed until the local matching funds are available.

Currently, a typical cost share for State expenditures is commonly set at 50% of total cost, with variation from that amount for specific reasons. For example, the State's share for an action serving a disadvantaged community could be as high as 90%. Projects providing ecosystem restoration or multiple benefits could receive up to 70% State cost share. By changing the cost sharing requirements for some actions more funding becomes available.

How does implementation of recommended actions (Chapter 3) impact what and when management actions are funded?

In this Water Plan, there are a number of recommended actions that prioritize addressing system deficiencies and emerging issues. The recommend actions from Chapter 3 are focused on actions that support State governance, technical and financial assistance, and operations to improve the consistent funding of ongoing actions. By prioritizing the implementation of the recommend actions, all management actions are still funded, with ongoing and recommended actions being funded throughout the 50-year planning horizon. However, by changing priorities, funding for some capital actions are delayed but are fully funded within the fifty-year planning horizon. Also, prioritizing ongoing and recommended actions enables an optimal distribution of funding across mechanisms, so that local, State, and Federal agencies share the burden of investment in California's water resources management system.

Qualitative Analysis of Funding

The qualitative analysis of funding was performed by reviewing the quantitative results and taking into account qualitative considerations. Qualitative considerations reviewed included:

- **Inter-Annual Reliability** - Many of the management actions used in the funding approach require annual expenditures, such as operation, maintenance, repair, replacement, and rehabilitation (OMRR&R), institutional capacity, and emergency management. In addition, given the magnitude of the capital expenditures, a funding approach that lasts for multiple decades is required. Therefore, a combination of recurring funding and less frequent one-time mechanisms (such as bonds) is needed to meet California's water resources management needs.

- **Nexus and Applicability** – A mix of funding mechanisms with a nexus and applicability to the water resources management actions is necessary to develop a viable funding approach. Nexus refers to the connection between the benefits received and the costs allocated. Applicability refers to the appropriateness of the funding or mix of funding for the specific benefit received or action taken. If the nexus and applicability of funding mechanisms to management actions cannot be established, then the mix of funding may not be appropriate.
- **Political Viability** – Any funding and investment of water resources management requires support of voters, local water agencies, the California Legislature, and policy makers. The political viability of the funding approach, as well as individual mechanisms, was considered, as voters and policy makers have opposed some funding mechanisms in the past. However, as the need for investment in water resources management continues to expand due to insufficient funding, a reevaluation of mechanisms is prudent. Some may take time to gain traction and buy-in, but they are too important to disregard solely because of current political hurdles. For the purposes of the approach for funding the Water Plan; however, current political sentiment dictates whether and when funding mechanisms can be used.
- **Ability and Willingness to Pay –** Any funding approach considers whether a beneficiary has the financial capability to pay, as well as what they are willing to give up monetarily to receive a benefit. In some areas of the State, not all beneficiaries are able to pay for the benefits received, due to financial circumstances. Also, some beneficiaries are not willing to pay for certain benefits and oppose implementation of specific management actions. Ability and willingness to pay are used to determine whether a funding approach is economically and financially viable.
- **Competing Demands** - Any funding approach must consider how the availability of funding sources is limited. Furthermore, capital and ongoing water resources management needs compete with other public services (e.g., fire departments, schools, police services) at the local, State, and Federal level for limited funding. The funding approach considers competing demands by reviewing the current environment related to public priorities for funding.
- **Capability/Capacity –**Any funding approach considers whether the State and the water resources management community has the resources and skillsets to implement the approach. Implementability is determined by reviewing if there is (a) capability (the human skills, expertise, and experience along with the analytical tools and data) and (b) capacity (sufficient available staff with expertise and time) needed to undertake the actions within the timeline identified.
- **Historical Expenditures –** Any funding approach uses historical expenditures to provide a baseline for comparing future expenditures.

These considerations were used to review the information from the quantitative analysis through a qualitative considerations lens.

Funding-Specific Findings

Funding-specific findings were developed to aid decision makers, stakeholders, and the State in formulating a 50-year phased approach to support investment in actions that contribute to the sustainability of water resources management in California. Also, these findings provide insight into how constraints (including legal definitions of what can be funded and required cost shares) and public

preference (what management actions or outcomes are prioritized) can impact if and when management actions are funded.

How much funding is needed for each phase?

[Under development]

What management actions are funded in each phase?

[Under development]

What management actions are not funded?

[Under development]

How do priorities and inputs affect funding?

[Under development]

How do priorities and inputs affect phasing of funding?

[Under development]

Chapter 5. Funding and Implementation Plan

Introduction

This chapter is intended to provide decision-makers and implementers with a practical and actionable plan. It will also explain how this chapter is to be used, and how it pulls together the recommendations, funding mechanisms, and other content from preceding chapters.

CWP Funding Plan

This section lays out a recommended funding mix and timeline for each Thematic Area[25]. It also includes total recommended funding from each mechanism.

1. *Recommended Funding Mechanisms and Timeline*
    a. *Thematic Areas*
    b. *Funding Implementation Timeline*
2. *Near-Term Funding Actions*

State Government Delivery of Update 2018

This section will identify state government's role and responsibility to fund and implement the Update 2018 recommendations

1. *Legislature*
2. *Executive*
    a. *Governor's Office*
    b. *Agencies*
    c. *Departments*

Annual Progress and Policy Guidance Report

This section will describe how recommendations from Update 2018 will be monitored and annually assessed to determine implementation progress. The Annual Report will provide policy guidance to reaffirm Update 2018 recommendations that have not been implemented and refine policy guidance based on emerging issues/challenges.

1. *Monitor and Assess Status of Recommendations*
2. *Policy Guidance Adjustments and Refinements*

The Way Forward

This section will underscore the importance of:

a) Implementing Update 2018 and may include assistance from Update 2018 Advisory Groups (Policy AC, Tribal AC, and State Agency Steering Committee) and/or letter from Governor.

[25] Thematic Areas represent different sectors of water management that warrant distinctive mix of funding mechanisms. The Thematic Areas include: Flood Management, Water Supply Reliability, Water Quality, Ecosystem Management, People & Water. The Thematic Areas provide the appropriate scale for State investment planning and funding decisions.

b) Establishing a long term commitment of supporting the innovations of Update 2018 including the continued application of the Sustainability Outlook, updating of the Funding and Implementation Plan, and on-going alignment of State Agencies through the Water Plan Update processes.